CONFERENCES

IMPERIAL AGRICULTURAL RESEARCH CONFERENCE, 1927

IMPERIAL BUREAU OF MYCOLOGY
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Abstracts of Papers

on

Agricultural Research

in the

United Kingdom.

published during the year October, 1928 to September, 1929.

REFERENCE ONLY

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PREFACE.

The present volume is a continuation, for 1928–9, of a Volume prepared for the Imperial Agricultural Research Conference, 1927. It contains abstracts of papers published in the academic year October, 1928, to September, 1929, dealing with agricultural research work in the United Kingdom. The papers abstracted have been limited to those dealing with results or methods of research work in agriculture. The abstracts have been made by the investigators themselves.

The arrangement on the basis of subjects is shown in the contents sheet. Under each subject the work of research institutes is first dealt with, followed by the work of advisory centres. In appendices are given (1) a list of research institutes, advisory centres, Government departments, etc., contributing the abstracts contained in the volume, with the pages on which their abstracts respectively appear, (2) a list of the authors, with pages on which their abstracts appear, (3) a more detailed list of the subjects than is contained in the contents sheet with references to pages, and (4) a list of abbreviations of titles of periodicals, etc., used in the volume.

Copies of the Volumes for the academic years 1926–7 and 1927–8 are still available and may be obtained, price 1s. net, each volume, from the Ministry of Agriculture and Fisheries.

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(A.) SOILS, MANURES, PLANT NUTRITION AND GENERAL CHEMISTRY.

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

FAGAN (T. W.) *et alia*. **The Effect of Nitrate of Soda on the Yield and Chemical Composition of a Simple Seeds Mixture in the first Harvest Year.** *Welsh Plant Breed. Sta. Bull. Series H. No.* 9. Nov., 1928.

The nitrate of soda has increased the yield of grass, whether cut weekly or monthly, and has had a similar effect on the hay and two aftermaths. The manure has increased the protein, and, on the whole, lowered the fibre content of the weekly and monthly cut grass, hay and first aftermath. The application of nitrate of soda depresses the phosphoric acid and lime content of the weekly and monthly cuts, as well as the phosphoric acid content of the hay. The effect of the manure in extending the growing season as shown by these results is more obvious in the later than in the earlier part of the season, due probably in this case to the cold, dry spring. The response to the manure is greater in the case of the grasses than the clover ; this, coupled with the late growth of the clover, results in the latter, under most conditions of this investigation, being shaded and smothered by the grass.

HORTICULTURAL RESEARCH STATION, EAST MALLING.

AMOS (J.) and HOBLYN (T. N.). **Manurial Trials with Hops.** *East Malling Res. Sta. Ann. Rep.* for 1926–27. (Oct. 1928) (II. Supp.) 165–171.

A manurial trial of hops was laid down in 1921 at East Malling, and results of this trial, extending over the last six years, are here presented.

The experiment included :—

(1) A trial of various organic manures against dressings of dung of a similar manurial value according to the analysis.
(2) A comparison of different phosphatic manures.
(3) Trials of quantity and kind of potash.

The most striking feature of this experiment has been the difference in hill yields where the ravages of "mosaic" have resulted in a wider spacing of the hills. This has affected the trial to such an extent as to make the significance of any results exceedingly problematical.

In the organic series it is very doubtful whether any of the manures used were as beneficial as dung. The shoddy plots were generally the lowest in yield.

There is no evidence to show that there has been any benefit from the applications of phosphate on this soil, but the lower yield of these plots, which received their nitrogen in the form of shoddy, seems to bear out the comparatively ineffective nature of this grade of shoddy.

Applications of potash appear to have had a beneficial effect, but where a treble quantity was applied there was no increase in yield, and it seems possible that towards the end of the period the extra amount may have been even detrimental.

There seems to have been no difference between the yields of plots receiving potash in the form of sulphate and sylvinite.

GRUBB (N. H.). **The Effects of Potash Fertilizers on Apple Trees.** *East Malling Res. Sta. Ann. Rep.* for 1928. (Apr., 1929.) (I. General), 70–72.

(Notes and advice to growers based on an experiment reported in the *Journ. of Pom. and Hort. Sci.* 7, 1 and 2, July, 1928, under this title.)

Growers are reminded that potash fertilizers are not likely to have much effect on apple trees unless there is at least some indication of "leaf. scorch."

Other questions discussed are :—

(1) The possibility of controlling leaf scorch by potash dressings where the cause is water-logged soil.
(2) The quantity and frequency of potash dressings required for the cure and prevention of leaf scorch.
(3) The relation between root-stock and the need for potash dressing.
(4) The best form of potash fertilizer.
(5) The possibility of controlling leaf scorch by "grassing down."

ROTHAMSTED EXPERIMENTAL STATION.

CROWTHER (E. M.) and BASU (J. K.). **Note on a Simple Two-compartment Electrodialysis Cell for the Determination of Exchangeable Bases.** *Trans. Second Com. Inter. Soc. Soil Sci. Budapest.* 1929. Part A, p. 100–102.

Bradfield's two-compartment cell for the determination of exchangeable bases has been modified to enable the bases to be obtained in a smaller volume of solution. The soil is placed on the bottom of a wide Alundum thimble resting on a perforated nickel kathode, and the anode is a perforated platinum disc close to the surface of the soil. With this arrangement the whole of the soil, but none of the uncovered membrane lies immediately between the electrodes. The ratio of endosmotic flow to ionic transport is reduced to a minimum.

CROWTHER (E. M.). **Soils and Fertilisers.** *Ann. Rep. Soc. Chem. Ind.*, 13 (1928), pp. 469–506.

The progress of recent research work on soils and developments in the fertiliser industry are reviewed and discussed. The points considered in most detail are the manufacture of nitrogenous fertilisers, the manuring of grassland, the mechanical analysis of soils and the availability of plant nutrients. There are abundant references to the original papers and to British Chemical Abstracts.

CRUMP (L. M.) and CUTLER (D. WARD). **Carbon Dioxide Production in Sands and Soils in the presence and absence of Amoebae.** *Ann. App. Biol.*, vol. xvi, No. 3, pp. 472–482. 1929.

Experiments are described on carbon dioxide production from soil and sand cultures containing a species of bacterium with and without amoebae. The following results were obtained :—

(1) Carbon dioxide production and bacterial numbers are correlated provided that amoebae are not present, or are present in very small numbers.
(2) The bacteria are more efficient as producers of carbon dioxide when their numbers are not rising and less efficient when their numbers are increasing. This does not hold for young cultures. Also each bacterium becomes less efficient as the density of the population increases.

(3) The amoebae cause a decrease in carbon dioxide production in sands containing peptone, but an increase in sands containing mineral salts solution with glucose or soil extract.

FISHER (R. A.). **A Preliminary Note on the Effect of Sodium Silicate in increasing the Yield of Barley.** *Journ. Agric. Sci.*, 1929. Vol. xix, pp. 132–139.

The addition of sodium silicate has been found to increase the yield of barley to a considerable extent, this effect being most marked when no superphosphate is added.

That additional phosphate is actually made available to the crop on the plots receiving silicate is shown by the increase in the proportion of phosphate in the dry weight of the crop, which appears on all the plots, and at all periods.

This increase is quantitatively sufficient to account for the increased yield in grain and straw, without postulating the aid of any stimulus to plant growth.

GRAY (P. H. H.). **"Vibrio (Microspira) Agar liquifaciens" Gray and Chalmers.** *Ann. Inst. Pasteur*, vol. xliii, p. 1058, 1929.

A reply to a criticism in a previous number of the above journal, as to the cultural purity of the organism described by Gray and Chalmers in 1924.

HEINTZE (S. G.) and CROWTHER (E. M.). **An Error in Soil Reaction Determination by the Quinhydrone Method.** *Trans. Second Com. Inter. Soc. Soil Sci.* Budapest. 1929. Part A, pp. 102–111.

In several series of soils from West Africa, Siam and England the pH values obtained by the quinhydrone electrode occasionally exceeded those by the hydrogen electrode by more than 1·0. Such erratic soils could be detected by the fact that in potassium chloride suspension the soil paste gave a higher pH value than the clear supernatant liquid when both were measured by quinhydrone. The reduction in acidity is clearly shown when quinhydrone is added to a mixture of an erratic soil with an indicator solution. It is ascribed to the production of manganous hydroxide by an interaction of quinhydrone with manganese dioxide associated with the soil colloids.

JENSEN (H. L.). **On the Influence of the Carbon: Nitrogen Ratios of Organic Material on the Mineralisation of Nitrogen.** *Journ. Agric. Sci.*, vol. xix, Pt. I, p. 71, 1929.

Organic material with a C:N ratio ranging from about 85:1 to about 10:1 was submitted to nitrification tests in an acid and in an alkaline soil during a period of 6 months. In the acid soil only pea pod meal, with a C:N ratio of 13·3:1 showed an increase in organic N over control; in the alkaline soil the limit above which no nitrification will occur within a period of 6 months was at C:N–26:1; below this limit the rate of nitrification increased rapidly with decreasing C:N ratio. Unnitrified N was left behind in a quantity corresponding to 1·5–2·2 per cent. of the original material, the percentage being higher in the case of material rich in N.

As a general result the experiments show that the carbon-nitrogen ratio is a factor which exerts an influence on nitrification as profound as that of soil reaction, and that the less complete utilisation of farmyard manure nitrogen as compared with nitrogen in artificial fertilisers can to a large extent be explained hereby.

KEEN (B. A.). **Some Comments on the Hydrometer Method for Studying Soils.** *Soil Sci.*, 1928, vol. xxvi, No. 4.

Some earlier criticisms made of Bouyoucos's hydrometer method for measuring colloid content of soils are substantiated in the present paper, using for this purpose the later data brought forward by Bouyoucos in his attempt to refute the criticism.

KEEN (B. A). **Soil (in part).** *Encycl. Brit.*, 14th ed.

SCOTT BLAIR (G. W.) and CROWTHER (E. M.). **The Flow of Clay Pastes through Narrow Tubes.** *Journ. Phys. Chem.* 1929, vol. xxxiii.

The theoretical and practical examination of the behaviour of clay pastes under stress. This work has resulted in a further extension of the theory of plasticity.

SCOTT BLAIR (G. W.). **Ueber die Geschwindigkeitsfunktion der Viskositat disperser Systeme.** *Kolloid-Zeits*, 1929, vol. xlvii, No. 1.

A critical examination of the results obtained by Ostwald and his numerous fellow-workers. It has shown that his results can be more simply interpreted on the basis of the ideas worked out in the above paper.

SCHOFIELD (R. K.) and KEEN (B. A.). **Rigidity in Weak Clay Suspensions.** *Nature*, 1929, vol. 123, No. 3100.

A SUB-COMMITTEE OF THE AGRICULTURAL EDUCATION ASSOCIATION. **The Revised Official British Method for Mechanical Analysis.** *Journ. Agric. Sci.*, 1928, vol. xviii, pt. iv.

THORNTON (H. G.). **The Role of the Young Lucerne Plant in Determining the Infection of the Root by the Nodule-forming Bacteria.** *Proc. Roy. Soc. B.*, vol. 104, p. 481, 1929.

The appearance of nodules on seedlings of lucerne (*Medicago Sativa* L.) coincides with the opening of the first true leaf. There is evidence that before this leaf opens the nodule bacteria do not as a rule infect the root hairs. The delayed infection is due to the plant and not to any delay in the development of infective power by the bacteria.

When young inoculated seedlings, whose first leaves are still closed, are grown intermingled with older plants, a considerable number of nodules will develop on them, although scarcely any are formed on control seedlings of the same age grown by themselves.

The solution surrounding the roots of seedlings whose first leaves are expanded has an influence in stimulating the appearance of nodules on younger seedlings, and increases the growth of the nodule organism on agar. The solution surrounding the roots of younger seedlings has no such effect.

The active substance inducing nodule appearance when the first leaf opens is not formed in this leaf, since the removal of the leaves, while still closed, has no effect on nodule appearance.

THORNTON (H. G.). **The Influence of the Number of Nodule Bacteria applied to the Seed upon Nodule Formation in Legumes.** *Journ. Agric. Sci.*, vol. xix, pt. II, p. 373. 1929.

In a field trial with lucerne grown from seed treated with varying doses of culture it was found that the numbers of nodules were increased as the dose was raised from 2,500 to 20,000 organisms per seed (56 to 7 lb. of seed per culture). Storing the seed for periods up to 28 days between inoculation and sowing caused some loss in the nodule numbers. This loss was greatest between 1 and 7 days' storage.

The difference in dose of culture and in period of storage did not significantly affect the crop subsequently obtained from the inoculated plots, whose yield was, however, much above the uninoculated.

In a pot experiment made with runner beans, it was found that increase in the dose of cultures above 1,280,000,000 organisms per pot, containing six seeds, was still capable of increasing nodule numbers, but not to an extent proportional to the increase in dose.

THORNTON (H. G.). **The Effect of Fresh Straw on the Growth of Certain Legumes.** *Journ. Agric. Sci.*, vol. xix, pt. II, p. 563, 1929.

In pot experiments with *Glycine hispida* and *Vicia faba* L., fresh chaff incorporated with the soil caused a significant increase in the number of nodules produced on inoculated plants, this increase being augmented by the further addition of phosphates. Fresh chaff, added at the time of sowing and inoculation had more effect than chaff which was allowed to decompose in the soil for a month. Fresh chaff increases the multiplication of the nodule organism in sterilised soil.

In soy beans without nodules, the chaff depressed the growth of the tops, but this depression did not occur either with soy or broad beans where nodules were present.

In a field experiment made at Rothamsted, chaff, freshly ploughed in, increased the growth of broad beans and also of wheat sown the next season on the same ground.

EXPERIMENTAL AND RESEARCH STATION, CHESHUNT.

OWEN (O.). **The Occurrence of Chlorates in a Tomato Soil.** *Journ. Pom. and Hort. Sci.*, 1929, vol. vii, p. 270.

The toxic effects in a tomato soil were traced to the presence of a chlorate or chlorates. The complete removal of the compounds by leaching did not seem possible, as a sample washed with twenty-five times its own weight of water was not without detrimental effect on a tomato plant. Autoclaving the soil caused the toxicity to disappear, but autoclaving the aqueous extract was without effect. The estimation and identification of the chlorate are described, and the concentration was found to be equivalent to 0·0193, 0·0284, and 0·0297 per cent. $NaClO_3$ in different samples.

OWEN (O.). **The Effect of Copper Sulphate on Tomato Plants.** *Ann. App. Biol.*, vol. xvi, p. 430, 1929.

No benefit appears likely to accrue from the addition of copper sulphate to tomato soils. The rate of germination may be stimulated, but the total germination is unaffected and the subsequent growth of the seedlings is often unsatisfactory. The toxicity of copper is greater when used as sulphate than when added in the form of Cheshunt Compound. When soil is definitely poisoned, the addition of new soil round the stems of the plants, and the application of hydrated lime are beneficial. Small amounts of copper sulphate in the soil do not affect the number of seed per fruit or the ability of the seed to germinate, but the subsequent seedlings are not satisfactory.

ABERDEEN UNIVERSITY, SOILS AND DRAINAGE DEPARTMENT.

HENDRICK (JAMES) & WELSH (HUGH D.). **The Substances Removed by the Drainage from a Scottish Soil.** *First Inter. Cong. Soil Sci.*, vol. ii, pp. 358–366, 1928.

This paper gives an account of the lysimeter investigations which have been in progress at Craibstone for a number of years. It deals with the analyses of the drainage water and shows in pounds per acre the amounts of nitrogen and of bases and acids washed from the soil annually. The soil on these drain gauges is cropped in the ordinary rotation of the district and it is shown that the loss of nitrogen is less than was expected from the results obtained from the uncropped lysimeters at Rothamsted or from the artificially filled lysimeters used at other places. It is also shown that in a soil of this type containing large reserves of soda and magnesia in the form of silicates the amount of these bases found in the drainage is greater than has been recorded elsewhere. On the other hand the loss of lime in the drainage is correspondingly less than found elsewhere. It is shown that carbonate is practically absent from Craibstone drainage, but on the other hand silicates are found in considerable quantity in solution. The reasons for these peculiarities in the composition of the drainage water are discussed in the paper and the bearing of the facts upon base exchange in soils is considered.

HENDRICK (JAMES). **Some Notes on the Conditions of Nitrification.** *First Inter. Cong. Soil Sci.*, vol. iii, p. 229–236, 1928.

It is generally stated in text books that nitrification is checked or prevented by acid conditions in the soil. This paper gives a record of certain experiments carried out with Craibstone soil, which show that nitrification proceeds very actively even when the soil shows a considerable degree of acidity which during the experiments fell as low as pH 4·9. It was shown in drainage experiments that even when excessive amounts of sulphate of ammonia were added to such soils, (1) the nitrogen was washed through in the drainage in the form of nitrate, (2) the total nitrogen applied was recovered as nitrate, and (3) the nitric acid recovered was combined with bases, lime, magnesia and soda, which must have been derived from the silicates of the soil.

HENDRICK (JAMES) and NEWLANDS (the late GEORGE). **The Mineral Composition of the Soil as a Factor in Soil Classification.** *First Inter. Cong. Soil Sci.*, vol. iv, pp. 104–107, 1928.

This paper gives an account of work upon the mineralogical composition of the soil carried out upon certain Scottish and English soils by methods which are described in the paper. The mineral constituents of the soil were divided into three groups—the Potash Felspar Group, the Quartz Group, and the Ferro-Magnesium Silicate Group. It is shown that the Scottish soils in general are characterized by a relatively high content of undecomposed silicates which contain large reserves of chemical bases, while the English soils were found to contain little such material. The reasons for this difference are discussed. It is further shown that Scottish soils can be differentiated according to the kind of minerals present and their relative amounts, and that a classification made on this basis groups together soils whose parent material is of a similar nature and origin.

NEWLANDS (the late GEORGE). **Scottish Soil Types with Special Reference to North East Scotland.** *First Inter. Cong. of Soil Sci.*, vol. iv, pp. 194–199, 1928.

In this paper an account is given of the types of soil found in the north east of Scotland, and the classification of Scottish soils is discussed. The complex nature of the country topographically and geologically is considered, together with the severe glaciation which it has undergone, the nature of the climate, the nature of the native vegetation and the fact that much of the land has been under cultivation for a very long period. The typical soil profile of the district is considered together with its dependence upon the various factors mentioned.

BRISTOL UNIVERSITY AND LONG ASHTON FRUIT RESEARCH STATION.

LING (A. W.). **Some Pot Experiments on the Manuring of Sugar Beet.** *The Bristol Beet Grower*, vol. ii, no. 6, Feb., 1929.

These experiments were commenced in April, 1927, and continued during 1928, in order to obtain some detailed information on the effect of the omission of various plant nutrients from the food of the sugar beet.

The nutrient solutions used and the method of their application are fully described by Wallace (*Ann. Rep. Res. Sta., Long Ashton*, 1921).

The data obtained illustrate the marked effect of the omission of nitrogen and phosphoric acid from the food of the beet. Although the figures in connection with the omission of potash are less striking, the actual beet were very much diseased and it was found that the beet in this series rotted a few days after they had been pulled.

WALLACE (T.). **Soil Surveys.** *Journ. Bath and West Soc.*, 6th Ser., vol. iii, 1928–29.

The paper is of a general character, and is intended primarily to bring the subject to the notice of the practical agriculturist.

An account is given of the development of soil surveys both in this country and abroad and of survey methods, special mention being made in this section of work carried out by the Russian soil scientists and by the U.S.A. Soil Survey.

Attention is drawn to the more modern survey work which has been carried out in this country, and the methods adopted and nature of the data collected in these are described. Possible uses of soil surveys are discussed and concrete examples of the value of the data collected in survey work on fruit areas in the West Midlands are given.

WALLACE (T.). **Leaf Scorch on Fruit Trees.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton*, 1928. Also in *Journ. Bath and West Soc.*, 6th Ser., vol. III, 1928–29.

This is an abridged form of the paper of the same title published in the *Journ. Pom. and Hort. Sci.*, vol. VI, No. 4, 1928; vol. VII, Nos. 1 and 2, 1928, and of which an abstract has been previously given. (Abs. of Papers, published period Oct., 1927, to Sept., 1928, p. 15).

WALLACE (T.). **The Utilisation of Local Supplies of Chalk and Limestone.** *Journ. Bath and West Soc.*, 6th Ser., vol. III, 1928–29.

The paper is a report compiled for the Experiments Sub-Committee of the Society, embodying the results of investigations carried out under the Sub-Committee relative to the utilisation of local supplies of chalk and limestone for agricultural purposes by landowners or by groups of small farmers.

The specific points dealt with in the report are as follows :—

(1) The types of limestone (including chalk) available in the South and South-west of England.

(2) The suitability of certain small mills already on the market for the production on the farm of ground limestone and ground chalk from the above materials.

(3) The character of the products of such mills, and the efficiency of these products—as determined by pot experiments on barley—in correcting soil acidity.

(4) The possibility of producing cheap supplies of "burnt lime."

WALLACE (T.). **Investigations on Chlorosis of Fruit Trees. II. The Composition of Leaves, Bark and Wood of Current Season's Shoots in cases of Lime-Induced Chlorosis.** *Journ. Pom. and Hort. Sci.* vol. vii, No. 3, 1928.

The paper records the results of an investigation on the chemical composition of the leaves, bark and wood of terminal shoots in cases of lime-induced chlorosis of apples, pears, plums and raspberries. Data are presented for "chlorotic" and "green" shoots for ash in dry matter and ash constituents in ash.

It is shown that the results previously reported for apple leaves affected with lime-induced chlorosis hold for similar cases of leaves of pear, plum and raspberry, viz. in the chlorotic leaves, ash in dry matter is high and calcium is low and potassium is high in the ash. These three characteristics also hold in the bark of chlorotic shoots but, in the wood, the above relationship for calcium and potassium in the ash is not maintained.

Iron is frequently low in the leaves of chlorotic trees, but is usually high in the bark and wood of the shoots bearing such leaves.

WALLACE (T.). **Investigations on Chlorosis of Fruit Trees. III. A Chlorosis of Plums due to Potassium Deficiency.** *Journ. Pom. and Hort. Sci.*, vol. vii, No. 3, 1928.

A chlorosis of plum trees due to deficiency of potassium is described. It is shown that the particular chlorosis is developed where the soil conditions are such as to produce leaf scorch of apple and certain other kinds of fruit trees. Data relating to plantation details, soil characters, and the composition of the foliage from "green" and chlorotic trees are presented.

The foliage data show that chlorotic leaves contain low ash in dry matter; high iron, calcium, magnesium and phosphorus, together with low potassium in ash. These characteristics of the chlorotic leaves afford a means of distinguishing the particular chlorosis from lime-induced chlorosis where ash in dry matter is high, and the content of the ash in calcium is low and in potassium is high.

WALLACE (T.). **Investigations on Chlorosis of Fruit Trees. IV. The Control of Lime-induced Chlorosis in the Field.** *Journ. Pom. and Hort. Sci.*, vol. 7, No. 4, June, 1929.

An account is given of field investigations carried out with a view to discovering a method of controlling lime-induced chlorosis of fruit trees in commercial fruit plantations.

A description is given of the utility and limitations of methods previously used for controlling lime-induced chlorosis in various plants and the possibilities or difficulties of applying these to fruit trees are discussed. Experiments are described on the use of sprays containing ferrous sulphate and aluminous sulphate, and the effects of cover crops as means of controlling lime-induced chlorosis of fruit trees associated with iron deficiency.

It is shown that while spraying methods are unsuited for commercial purposes on fruit trees, owing to the temporary nature of the improvements effected, and the liability to produce injury, the use of cover crops appears to offer a simple and effective means of controlling the trouble.

This latter method was successful in experiments on apple trees, even when the surface soil contained 9·0 per cent. $CaCO_3$, and is likely to prove of great value in any case in this country.

ARMSTRONG COLLEGE—NEWCASTLE-UPON-TYNE.

THOMAS (B.). **The Changes in Soil Reaction effected by Long Continued Manuring.** *Journ. Soc. Chem. Ind.*, Feb., 1929, vol. xlviii, No. 8, p. 51.

The changes in reaction and exchangeable base content, produced by the long continued application of various manures to the Tree Field plots at Cockle Park, have been studied.

The supposed deleterious effect of superphosphate on base status and reaction is shown to be negligible. Dissolved bones have definitely increased the amount of exchangeable calcium present without appreciably affecting reaction.

Plots which have received basic slag alone, or in conjunction with nitrogenous and potassic fertilisers, show a marked rise in exchangeable base content, and small but significant pH increases.

Cake feeding over a period of 30 years has exercised a stabilising effect on soil reaction.

UNIVERSITY COLLEGE OF NORTH WALES, BANGOR.

Robinson (G. W.). **Tir Gwyllt yng Nghymru (Waste Land in Wales).** *Welsh Journ. Agric.*, 1929, v, 144–148.

In pre-historic times Wales was mainly covered with deciduous forest up to about 1,700 feet above sea-level. The present cultivated lands occupy the lower portions of this area. Above them occurs grass heath, changing at higher altitudes to heath, characterised by podsolization. Probably much of the original soil was eroded after deforestation and the present soils represent primitive sub-soils. Existing podsols are probably developed secondarily in the primitive B horizon. Alpine grassland occurs above heath. Other types include wet hollows, possibly formed by accumulation of soil washed down by erosion, river alluvium, marine alluvium, mountain peat, lacustrine peat and dune sands.

Robinson (G. W). **The Classification of Soils for Purposes of Survey.** *Nature*, 1929, cxxiii, 980.

A system of classification of soils for use in the Welsh Soil Survey is proposed. The first division is into suites, each characterised by the same or similar geological parent material. Each suite is then divided into series according to conditions of formation. Series are named after localities, following American practice. Final types are given by texture. For example, soils from older Palaeozoic noncalcareous sediments form a suite, of which the normal sedentary soils form the Powys series; the normal drift soils, the Penrhyn series; soils with impeded drainage the Bethel series; podsolised soils, the Hiraethog series; and alluvial soils, the Conway series.

Robinson (G. W.), McLean (W), and Williams (Rice). **The Determination of Organic Carbon in Soils.** *Journ. Agric. Sci.*, 1929, xix, 315–324.

The method, which is rapid and convenient for routine purposes, is based on the ordinary Kjeldahl oxidation with sulphuric acid. The sulphur dioxide evolved, which is absorbed in standard iodine solution, is used as a measure of the amount of organic carbon present. The results obtained show good agreement with results obtained by dry combustion, but it is necessary to use a factor, since the oxidation by sulphuric acid is never complete. The method can be conveniently combined with determination of nitrogen, and dispenses with the necessity for a fume chamber, since the gaseous products are absorbed.

LEEDS UNIVERSITY.

Willcox (J. S.) and Jones (H. Trefor). **Studies in Soil Genetics.** *Jour. Soc. Chem. Ind.* vol. 48, no. 40, p. 304T.

Seven Millstone Grit podsols are described. The various current theories of iron pan formation are discussed, and a further explanation is advanced.

It is shown that tartaric acid and oxalic acid extracts of soil deposit iron compounds on keeping. It is suggested that when sesquioxides are dissolved by soil organic acids, the iron enters into the electronegative portion of the molecule. These compounds then pass through the soil in solution and are ultimately precipitated as basic salts, thus giving rise to a zone of sesquioxide accumulation, and finally to a pan.

MANCHESTER UNIVERSITY.

SMITH (A. M.). **The Soils of Lancashire and Cheshire.** *Journ. Min. Agric.*, July, 1929, vol. xxxvi, no. 4.

A description of the main soil groups found in Lancashire and Cheshire with special mention of the figures obtained in an examination of "lime-requirement" and the fact that half of the soils in the centre of the province are extremely acid and demand immediate attention.

OXFORD UNIVERSITY.

MORISON (C. G. T.) and CLARKE (G. R.). **Some Problems of Forest Soils.** *Forestry*, vol. ii, no. 1, 1928.

The point is made that the study of the soil under forest conditions is particularly valuable to the soil worker, since the agencies at work are mainly natural. A brief description of modern soil classification is given with more particular discussion on podsolization. The dead leaf layer, its accumulation and decomposition are explained, while its effect on the recalcification of the surface horizons is pointed out as being a valuable preventative agent against podsolization.

The effect of different species having a specific influence on the soil profile is given with reference to some profiles existing in an Oxford forest.

READING UNIVERSITY.

NICHOLSON (H. H.) and PANTIN (B.). **The Leaching-Out of Autumnal Dressings of Nitrogenous Fertilisers.** *Journ. Agric. Sci.*, 1929, vol. xix, pp. 297–301.

Pot experiments were conducted in triplicate with equivalent dressings of ammonium sulphate, cyanamide and rape dust. Examination of the drainage water collected during the winter months showed that leaching out from all three forms may occur any time throughout the winter up to March. In 1926–7 the heaviest loss occurred in February and March; in 1927–8 it took place in December and January, directly connected with the amount of drainage, and so of rainfall. All three types lost at least 50 per cent. of their nitrogen, the amount being highest in the case of ammonium sulphate and least in that of rape dust.

EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.

HART (R.). **Studies in the Geology and Mineralogy of Soils.** *Journ. Agric. Sci.*, xix, 90 (1929).

A detailed account is given of the geology and mineralogy of Boghall Experimental Farm, Midlothian—a small area containing a variety of different rocks and mostly covered with glacial drift. In spite of the rock differences there is similarity in the mineral content of all the soils derived from the glacial drift and the minerals are chiefly those found in the local rocks. The soils on the drift material contain potash, phosphates and lime-bearing minerals.

KHALIL (F.). **The Effect of Drying on the Microbiological Processes in Soils.** (*Thesis for Degree of Ph.D., Edinburgh*, March, 1929).

In certain arid regions, drying the soil by exposure to intense sunlight has been observed to increase its fertility. Drying reduces the bacterial content of the soil, but after remoistening and incubation dried soils show higher numbers than soils kept permanently moist. Drying also increases the nitrogen-fixing capacity of the soil and its ammonifying and nitrifying power. No evidence could be obtained in support of the view that drying increases the efficiency of the soil microflora. Drying, however, renders the soil organic matter more easily decomposable and this may account for the observed beneficial effects upon ammonifying and nitrifying capacity and upon the bacterial content of the soil.

OGG (W. G.). **Reclamation of Peat Lands in Northern Europe.** *Scott. Journ. Agric.*, xii, no. 1 (1929).

The first part of the report gives an account of the different varieties of peat land. A second section deals with the methods of utilisation and examples are given of state reclamation, the work of Agricultural and Forestry Schools, the activities of Moor Cultivation Societies, and reclamation by communities and private individuals. The final section deals with details of the agricultural development of peat land, including draining, cultivation and manuring.

STEWART (R.). **The Manurial Requirements of Soils—Two Modern Methods of Estimation.** *Scott. Journ. Agri.*, xii, no. 3, 1929.

An account is given of two methods which are at present attracting much attention on the Continent, viz.:—Mitscherlich's Pot Culture Method and Neubauer's Seedling Method.

STEWART (R.). **The Availability of Potassium in some Scottish Soils.** *Journ. Agri. Sci.*, xix, 524, 1929.

The solubility of the potash in 34 samples from 13 soils typical of large areas in the S. E. of Scotland was determined by both chemical and "seedling" methods. Although ample reserves of potash were present in all the soils examined there were certain soils in which the potash did not appear to be available to plants in sufficient quantity.

WEST OF SCOTLAND AGRICULTURAL COLLEGE.

LOUDEN (C.). **An Acidity Survey of Two Parishes in the West of Scotland.** *Scott. Journ. Agric.*, 1929, 12, 383.

(B) CROPS AND GENERAL BOTANY not classifiable under (C) to (K).

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

DAVIES (WILLIAM). **Seeds Mixture Problems: Sowing and After Management.** *Welsh Journ. Agric,* vol. v, p. 133, Jan., 1929.

The paper constitutes a review of results recently obtained at the Welsh Plant Breeding Station relative to seeds mixtures and the early management of proposed leys.

In Wales the best time for sowing herbage seeds is April and May. The larger seeded species establish themselves better than do the small seeded.

Simple mixtures are discussed and examples are given of simple hay and pasture mixtures that have given uniformly good results in Central Wales.

LONG ASHTON FRUIT RESEARCH STATION.

HUTCHINSON (H. P.). **The Cultivation of Willows on Sewage Farms.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928.

The wet conditions of sewage farms are favourable to the growing of basket willows in preference to other crops.

The methods of control of sewage products to accommodate the willow crop are described. Detailed information on suitable varieties, planting systems and management of the crop is given.

Attention is drawn to the suitability of sewage land for cricket-bat willows as proved by experience.

NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.

HAWKES (F. C.). **Cereal Crops in Essex, 1926–27.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A report on records of the cereal crops grown by Essex farmers in 1926–27, collected by Mr. J. B. Gill, Secretary of the Essex Farmers' Union. The records cover from 4–5 per cent. of the total cereal area in Essex, and the report gives the yields, prices and cash returns per acre in respect of the principal varieties and deals also with the effect of differences in the soil, and in date of sowing. There is an appendix by Dr. E. S. Beaven on the differential response of varieties of cereals and particularly barleys to soil conditions. This report was also published in the Essex Farmers' Union Year Book, and a summary in the *Journ. Min. Agric.*

PLANT BREEDING INSTITUTE, CAMBRIDGE.

DOUGHTY (L. R.), ENGLEDOW (F. L.) and SANSOM (T. K.). **Investigations on Yield in Cereals. VI. A. A developmental Study of the Influence of Nitrogenous Top-dressing on Wheat. B. A Measurement of the Influence of Disease ("Take-all") upon the Yield of Wheat.** *Journ. Agric. Sci.*, vol. xix, 3. July, 1929.

Nitrogenous top-dressing of wheat increases yield solely by increasing ear size. It does not effectively increase tillering, either early tillering or number of ears per plant.

The loss attributable to "take-all" fungi in a badly affected field was demonstrated by an accurate survey to be of the order of 40 per cent.

ENGLEDOW (F. L.). **Yield and Population in Sugar Beet.** *Journ. Agric. Sci.*, xviii, pp. 574–601.

It is inferred that maximum potential yield for soil and season is not attained on ordinary fields of beet. Irregular plant is primarily responsible and, in turn, is induced by a number of influences of which faulty seed drill action is chief. With rows at 16–18 inches apart a seeding of 17 lb. per acre appears best. Light seedings of 10–12 lb. may, in very favourable circumstances, bring good results, but are in general not dependable.

ENGLEDOW (F. L.), MAHER (C. A.), SMITH (J. HUNTER), WILLIAMS (H. RHYS), FAIL (H.) and RAYNS (F.). **Yield and Plant Population in Sugar Beet.** *Journ. Agric. Sci.*, vol. xviii, 4., Oct., 1928.

In sugar beet the seedling population is highly irregular. This makes singling very costly and results in gaps and irregularities in the mature plant. In six typical fields of beet the sacrifice of potential yield thus arising was of the order of £5 to £6 per acre.

WOODMAN, H. E. **Recent Pasture Research and its Practical Significance.** *Scott. Journ. Agric.*, xi, 377, 1928, Oct., 1928.

The main findings of the Cambridge pasture investigations are dealt with and the relation of these findings to the practical problems of grassland management are discussed.

WOODMAN (H. E.). **The Conservation of Young Grass.** *Essex F. U. Journ., Feb.* 1929.

A reprint of a lecture given to the Essex Branch of the N.F.U., in which the progress and prospects of methods for conserving young grass, either as silage, or in the form of dried grass cake, are reviewed.

WOODMAN (H. E), NORMAN (D. B.) and BEE (J. W.). **Nutritive Value of Pasture: IV. The Influence of the Intensity of Grazing on the Yield, Composition and Nutritive Value of Pasture Herbage. (Part II.)** *Journ. Agri. Sci.*, xix, 236, Apr., 1929.

A continuance of a series of investigations designed to secure information concerning the composition, digestibility and nutritive value of pasture grass in its different stages of growth. Although grass obtained by cutting every three weeks is somewhat less rich in protein than that obtained under more severe systems of cutting, there is little to distinguish grass grown under weekly, fortnightly and 3 weekly systems of cuts, so far as digestibility is concerned. At the end of a 3 weeks' period of growth, grass still retains the non-lignified, highly digestible character which it possessed at the end of a week's or a fortnight's growth. It is shown that the depressing influence of drought on digestibility and protein content becomes less pronounced as the system of cutting becomes more lenient.

Pasture obtained under a system of 3-weekly cuts, while slightly less rich in protein, is nevertheless equal in respect of total digestible organic matter and of starch equivalent to grass grown under systems of weekly and of fortnightly cutting. The dry matter of such herbage is still to be looked on as a protein concentrate of high digestibility and nutritive value. It was demonstrated that if the management of the experimental pasture had been attempted along the lines of close grazing *under the weather conditions of*

1928, a simple division of the main field into a suitable number of smaller enclosures for rotational grazing at 3-weekly intervals (i.e. a 3-weeks' "rotational close-grazing" system) would have enabled the stock-carrying capacity of such unfertilized pasture to be increased in the ratio of 3:2.

The significance of the results in relation to the problems of the grazier and to those of pasture grass conservation is discussed.

AGRICULTURAL ECONOMICS RESEARCH INSTITUTE, OXFORD.

BRIDGES (A.) and DIXEY (R. N.). **Sugar Beet in France, Belgium, Holland and Germany.** *Clarendon Press.*

The authors have set down the facts collected and impressions gained during several visits to the countries mentioned, where sugar beet is an important agricultural crop. In the introductory chapter soils, size of holdings, rotations and cropping, livestock and labour are touched upon. There are chapters dealing with cultivation questions, such as seed, manuring sowing and summer cultivations and harvesting. The question of yields, the utilisation of by-products, costs and returns, price fixing and other matters involving relations with factories, are also dealt with in separate chapters. There is a concluding chapter in which the effect of sugar beet on agriculture is discussed.

ROTHAMSTED EXPERIMENTAL STATION.

BISHOP (L. R.). **Composition and Quantitative Estimation of Barley Proteins. I.** *Journ. Inst. Brew.*, 1928, vol. xxxiv, pp. 101–118.

Methods have been elaborated for the accurate estimation of the amounts of the following proteins in barley grain :—

(1) Salt-soluble compounds (hordein, globulin and protein breakdown products), (2) Hordein, (3) Glutelin.

Applied to samples of Plumage-Archer barley, the methods showed a regular relationship between the different proteins and the total nitrogen. With increasing total nitrogen the percentage of glutelin remains constant, the percentage of hordein rises regularly and the proportion of salt-soluble compounds falls correspondingly.

BISHOP (L. R.). **Composition and Quantitative Estimation of Barley Proteins. II.** *Journ. Inst. Brew.*, 1929, vol. 35, pp. 316–322.

The accuracy and reliability of the methods described in Part I have been increased and shown to be valid for malt. Further methods have been worked out for the detailed fractionation of the salt soluble compounds into albumin, globulin, intermediate (proteose) and simple ("non-protein") nitrogen compounds.

BISHOP (L. R.) **The Changes Undergone by the Nitrogenous Constituents of Barley during Malting.** *Journ. Inst. Brew.*, 1929, vol. xxxv, pp. 323–338.

About 100 hours after the commencement of steeping rapid breakdown of hordein and glutelin commences during flooring, giving rise to salt-soluble compounds, chiefly non-protein nitrogen. After 200 hours re-synthesis in the embryo balances breakdown in the endosperm, so that the proportions only change slightly after this time. These proportions are not markedly affected either by kilning or by variation, within limits, of the flooring time or the amount of moisture supplied.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

FAGAN (T. W.). **The Nutritive Value of Pasture Grass as influenced by Management.** *Welsh Journ. Agric.*, vol. v, 99–109, 1929.

Judged by the chemical composition of the produce, the main factors that appear to influence the nutritive value of our grassland are :—

Judicious grazing.—This results in greater development of leaf, which has a higher nutritive value than the stem. Again, care should be taken that in the summer months the growth does not get out of hand and that in the autumn quality is not sacrificed for yield.

Manuring.—Nitrogenous manures have been shown to have a beneficial effect on the yield and chemical composition of grasses, while phosphatic manures encourage the growth of clover, the presence of which adds considerably to the nutritive value of pastures and to their mineral content, especially of lime.

Variety of grass.—Indigenous varieties should be chosen in preference to commercial, owing to the former being more leafy.

CAMBRIDGE UNIVERSITY.

HANLEY (F.) **Report on Sugar Beet Demonstrations carried out on Fen Soils in Huntingdonshire and Isle of Ely during seasons 1927–28.**

This report deals with information on the growing of sugar beet obtained from plots laid down on fen soils in the two counties of Huntingdonshire and Isle of Ely during the seasons 1927 and 1928.

Details are given of the results obtained from the use of (*a*) mineral manures and (*b*) nitrogenous manures on good black fenland and on the poorer types of light peaty fenland.

Results from plots dealing with row-spacing and singling distance are discussed and descriptions are given of the chief characteristics exhibited by a number of varieties of Sugar Beet when grown on black fen soils.

The effect of certain diseases on the sugar content of sugar beets is illustrated by figures obtained from these plots.

HARPER ADAMS AGRICULTURAL COLLEGE, NEWPORT, SALOP.

DAVIES (W. MORLEY). **Experiments in the Cultivation of the Sugar Beet Crop in the West Midlands during 1927.** *Journ. Agric. Sci.*, vol. xviii, pt. iv, Oct., 1928.

The paper describes experiments designed to show the effect of variations in the spacing of sugar beet plants on the yield per acre. The results indicated that :

(1) The greatest expectation of yield is to be obtained when the rows are close together.

(2) There is no marked effect on yield by varying the distance between the plants in the row (up to 10 ins.).

(3) The returns showed a distinct advantage in favour of growing on the ridge compared with growing on the flat.

DAVIES (W. MORLEY). **The Cultivation and Manuring of Sugar Beet.** *Harper Adams Agric. Coll. Bull.*, Apr., 1929.

A publication written for the farmers of the West Midland Province.

This bulletin reviewed the experimental results referred to above, as well as those of the succeeding year—1928.

The experimental results of 1928 corroborated those of 1927 and afforded further information, viz. : That in conjunction with a crop of 13 tons of washed beet a crop of 20 tons of fresh tops and 1 ton of crowns may be obtained.

The section on manuring and liming is a collection of the latest information from experiments in the West Midland Province and West of England.

OXFORD UNIVERSITY.

CLARKE (G. R.). **Sugar Beet in Field and Clamp.** *N. F. U. Y. B.*, 1929.

A reference is made to the need for lime in the cultivation of beet, and to the need for the testing of soils for lime in doubtful cases.

The results of recent work on the optimum sugar content of beet in the field are given and it is shown how, by a second growth of leaves during October, the sugar content is depressed. The possibilities of clamping beet to prolong the factory campaign or to allow of earlier winter cultivation of land are discussed.

A statement of the probable profit and loss for the year in question was also made.

EAST ANGLIAN INSTITUTE OF AGRICULTURE.

OLIVER (F. W.), BRYCE (J.), and KNOWLES (F.). *Spartina Townsendii* (**Rice Grass**). **Its Economic Possibilities.** *Min. Agric. Misc. Pub., No.* 66.

Professor Oliver deals with the history, general characteristics and uses of the grass. He brings out that many problems still await investigation. Botanically, the genetical status has still to be worked out while practically a technique for its establishment in different situations requires to be elaborated. The plant's extraordinary power of spreading in favourable localities is a remarkable feature and Prof. Oliver envisages that "in the long run it seems destined to occupy all the available coastal mud in the temperate zones of both the northern and southern hemispheres." In conclusion, he gives an account of the large scale Dutch experiments, its exploitation for land reclamation, and the striking results achieved in the short space of four years.

Mr. Bryce describes experiments carried out in Essex between 1925 and 1928 to test the suitability of the plant for local conditions with a view to its use for preventing coast erosion and as a fodder crop. Of these conditions there are two main types—the high saltings, within 3 feet of high-water mark, already carrying a mixed type of vegetation, and the low slob lands consisting of vast stretches of bare, soft mud. *Spartina* has shown its power of adaptability to most of the situations in which it has been tried, but unaccountable failures have been experienced. Further experiment is required to discover all the limiting factors.

Mr. Knowles gives the results of his investigations into the chemical composition, nutritive value and feeding trials with sheep. Unfortunately, owing to unfavourable weather the *Spartina* hay with which he worked was only of indifferent quality. Nevertheless, he concludes that it has a value equal to poor meadow hay, and that there is reason to suppose, if made under better conditions, it would equal good meadow hay. Again further experiment is desirable and particularly on the possibility of making it into silage. It is noteworthy that sheep fed on *Spartina* hay, in confined conditions, maintained perfect health for a period of two months.

(C) PLANT PHYSIOLOGY (including POMOLOGY).

LONG ASHTON FRUIT RESEARCH STATION.

SWARBRICK (T.). **Factors Governing Fruit Bud Formation. IX.—Some Observations upon the Leaf Area of Spurs on Biennially Bearing Apple Trees.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928. Also in *Journ. Bath and West Soc.*, Ser. 6, vol. iii, 1928–29.

The leaf areas of two biennially bearing apple trees were measured and recorded over a two-year cycle and a definite relation between leaf area and blossom bud formation appears established.

The average number of leaves per spur is the same for both trees in their "On" years, and again it is the same in the "Off" years, notwithstanding that the two trees do not both bear in the same year. 50 per cent. more leaves are carried in the "Off" than in the "On" year. The areas of the leaves are 300 per cent. bigger in the "Off" year. The failure of blossom bud formation during the "On" year is probably due to paucity of leaf area.

SWARBRICK (T.). **The Abscission of Black Currant Shoots during the Growing Season.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928.

A marked abscission of black currant shoots took place during the growing season in 1928. It was found mostly on the cutting beds, but was also found in established plantings. No definite cause is known, but it took place in a period of rain following a prolonged drought.

HORTICULTURAL RESEARCH STATION, EAST MALLING.

AMOS (J.). **A Progress Report on Winter Pruning Experiments with Pear Trees.** *East Malling Res. Stn. Ann. Rep.* 1926–27, Oct., 1928 (II. Supplement). 65-71.

The three seasons winter pruning have shown that :—

(1) The total length of new annual wood growth is greater in the tipped trees in the first and third season after treatment. In the second season almost identical amounts are made on both unpruned and tipped trees. The amount per shoot has, in the majority of cases, throughout been greater on the latter.

(2) The unpruned trees in all cases show a greater girth measurement after the second treatment.

(3) Blossom bud formation in early years is reduced by tipping.

(4) The leaving of trees unpruned tends to early fruit production.

(5) The production of "terminal" and "axillary" blossom buds is shown to be a varietal characteristic.

(6) The tipped trees have been less affected by scab and canker than the unpruned trees in certain cases.

(7) Hard spurring of the laterals has resulted, in the majority of cases, in the production of potential blossom buds.

GRUBB (N. H.). **Apple Pruning. Summary of Deductions from Experiments at East Malling.** (Revised Jan., 1929.) *East Malling Res. Sta. Ann. Rep.* 1928. (Apl., 1929.) (I.—General.)

A revision of the Summary published in Oct., 1925.
Subject matter as follows :—

A. Objects and Methods of Pruning :—
1. To shape the tree. 2. To control the production of fruit buds and blossoms. 3. To maintain vigour. 4. To improve the quality of the fruit. 5. To help in controlling diseases and pests. 6. To check "biennial bearing." 7. To prevent the tree from occupying more than its allotted space. 8. To help in renovating old and neglected orchards.
Three operations in pruning :—
1. "Leader tipping." 2. "Thinning." 3. "Spurring" or "spur pruning."

B. Pruning required at different stages of growth.
C. Pruning must be adapted to root stock and soil.
D. Pruning permanent and "filler" trees.
E. Effects of over and under pruning.
F. Maintaining vigour.
G. Pruning helps in controlling diseases and pests.
H. Pruning must be adapted to variety.
J. Length of "spurring."
K. Biennial bearing.

HATTON (R. G.). **The Behaviour of Certain Pears on Various Quince Root Stocks.** *Journ. Pom. and Hort. Sci.*, 1928–29. 7. 216–233. (Dec., 1928.)

1. Four varieties of quince used as rootstocks commercially and three others of superior vigour were budded with eight pear varieties.

2. Whilst the percentage of buds which "took" and the nature of the subsequent "maidens" broadly demonstrated a safe and unsafe group of stocks, peculiar varietal preferences were apparent.

3. The subsequent behaviour of the trees demonstrated various manifestations of "incompatibility" on certain rootstocks, such as the commercial Type D.

4. Though the normal trees on quinces A, B, and C at present show no significant differences in vigour, those on C have proved outstandingly productive; capacity to make growth and form bloom buds early being united in this variety, which on its own roots is both dwarf and sterile.

5. The vigorous and more free cropping forms of quince E, F, and G, when used as rootstocks have failed to transmit these characteristics markedly to the scion, even where they have not proved wholly "incompatible."

HATTON (R. G.). **The Effects of Various Fruit Growing Practices on Fruit Quality and Market Value.** *East Malling Res. Sta. Ann. Rep.* 1928. (April, 1929.) (I.—General.) 47–61.

1. *Winter pruning* increases fruit size, helps to control scab, reduces other blemishes, and the method affects colour.

2. *A spraying* schedule as an effective control of scab, aphis, capsid and sawfly is outlined.

3. *The effect of feeding*, especially in relation to potash manuring, is illustrated by the differences in value of crops harvested, both bulk and quality being affected.

4. *Preliminary fruit thinning* experiments are outlined as showing effect on size, grade, weight and colour.

5. *The root stock* influences colour and size.

Some costings and returns on the experimental farm are given.

HATTON (R. G.), WORMALD (H.) and WITT (A. W.). **"Burr-Knots."** *East Malling Res. Sta. Ann. Rep.* 1926–27. (Oct., 1928.) (II.—Supplement.) 89–91.

This is a résumé of a more detailed paper which appeared in the *Journ. Pom.* 1926, 5, 195–204. Observations and experiments show that burr-knots are not a pathological condition, and that they are not a form of crown-gall.

HATTON (R. G.). **The Northern Spy as a Root Stock.** *East Malling Res. Sta. Ann. Rep.* 1926–27. (Oct. 1928.) (II.—Supplement.) 44–50.

The growth and early cropping of the variety Grenadier is compared when budded upon Northern Spy, and semi-dwarfing, vigorous and very vigorous layered rootstocks.

Under East Malling conditions, Spy would be classed as a semi-dwarfing rootstock, of the Doucin (Malling No. II) Group, but comparing unfavourably with it in early cropping.

KNIGHT (R. C.), AMOS (J.), HATTON (R. G.) and WITT (A. W.). **Vegetative Propagation of Fruit Tree Root Stocks.** *East Malling Res. Sta. Ann. Rep.* 1926–27. (Oct. 1928). (II.—Supplement.) 11–30.

Concurrently with the experiments upon root stock influence on scion, a series of trials have been carried out to determine the best methods of multiplying the fruit tree rootstocks by vegetative methods, in order to ensure the perpetuation of races with known characteristics.

Detailed descriptions are given of the various methods which have been used, and of the manner in which different varieties respond to them, together with some account of the influence of external conditions and of the inherent properties of the material in determining this response.

Tables show the actual numbers of individuals of the different varieties which have been obtained in series of trials extending over twelve years.

An appendix indicates which of these methods has been most consistently successful with each of the varieties tested.

KNIGHT (R. C.). **A Note on the Orientation of Main Branches and its Relation to Stocks in some "Double-Stock" Apple Trees.** *East Malling Res. Sta. Ann. Rep.* 1926–27. (Oct., 1928.) (II.—Supplement.) 56–59.

In a series of trees, each of which was grafted on two stocks (one on each side of the scion) of different vigour, the largest branches were not necessarily those on the side of the strongest root stock, but those emerging from the highest points on the main stem.

ROGERS (W. S.) and VYVYAN (M. C.). **Root Systems of Some Ten-Year Old Apple Trees on Two Different Root Stocks, and their Relation to Tree Performance.** *East Malling Res. Sta. Ann. Rep.* 1926-27. (Oct., 1928.) (II.—Supplement.) 31–43.

1. Six ten-year old trees of Lane's Prince Albert, of known life history, growing on the Lower Greensand over Kentish Rag, were dug up during the winter 1927–8.

2. The root systems of three of these trees, two on Malling Number I (vigorous), and one on Malling Number IX (very dwarfing) were excavated intact, as far as possible. Plans were made of the distribution of the roots as they were exposed, and photographs afterwards taken of the reconstructed root systems.

3. Three trees, two on Number IX and one on Number I, were dug up by the removal of blocks of soil of known size and position. The roots from each block were graded and weighed at once.

4. None of the trees had a tap root; the root system of each was composed of a scaffolding of roots running more or less horizontally near the surface of the soil; from these numerous vertical roots descended at all distances from the trunk, frequently following worm burrows. The depth limit was set by the rock or the sandy "Hassock" layer just above it; the roots did not enter this, but turned horizontally and formed much fibrous root in the clayey layer just above.

5. The root system of the Number I was two to three times as heavy as that of the Number IX and spread out farther from the trunk; it did not descend so deeply but this may have been partly due to the soil happening to be shallower under the Number I trees than under the Numbers IX. Three-quarters of the Number I root system and only half that of the Number IX occurred in the upper 13 inches of soil.

6. Fibre (roots less than 1 mm. diameter) occurred everywhere, growing in all directions, including vertically upwards; every root ended in fibre. The proportion of fibre to total root was 14 per cent. in the Number I and 13·3 in the Number IX.

7. Only some 10 per cent. of the fibre occurred in the region one yard square at the centre of the tree; the roots extended considerably farther out than the branches of the trees and some 40 per cent. of the fibre occurred in the outer part of the root system, more than 2½ yards from the trunk. This suggests that it is not a good practice to place manure mainly near the trunk of a tree.

8. The ratio of stem to root was about the same in both stocks, but that of fruit to root was more than twice as great in Number IX as in Number I.

The total fresh weight of fruit produced in ten years was in each case greater than the total fresh weight of stem and root.

TYDEMAN (H. M.). **The Influence of Root Stocks on the Blossoming of Seedling Apples.** *East Malling Res. Sta. Ann. Rep.* 1926–27. (Oct., 1928.) (II.—Supplement.) 51–55.

Preliminary trials as to the possible effect of dwarfing and vigorous rootstocks in shortening the "juvenile period" of apple seedlings have been carried out. The data indicate not only the dwarfing effect obtained by the use of certain rootstocks but an undoubted influence of the latter upon blossoming. Thus exactly 50 per cent. of the trees upon dwarfing and precocious rootstocks blossomed in their sixth year; of trees comprising the same individual seedlings worked upon vigorous rootstocks less than 9 per cent. blossomed, whilst only one of the parent plants growing upon their own roots has blossomed.

WITT (A. W.). **Vegetative Propagation of Walnuts.** *East Malling Res. Sta: Ann. Rep.* 1926–27. (Oct., 1928.) (II.—Supplement.) 60–64.

The budding and grafting of walnuts in the open appears to be frequently a failure as a result of climatic conditions in England.

Successful methods of hard wood grafting in March and of herbaceous grafting in July and August under controlled temperature conditions are detailed.

Attempts to raise rootstocks by soft wood cuttings are described.

RESEARCH INSTITUTE IN PLANT PHYSIOLOGY, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON.

GREGORY (F. G.) and RICHARDS (F. J.). **Physiological Studies in Plant Nutrition. I.—The Effect of Manurial Deficiency on the Respiration and Assimilation Rate of Barley.** *Ann. Bot.* XLIII, 119–162, 1929.

An investigation dealing with the respiration rates and assimilation rates at high and low light intensities of successive single leaves taken from plants deficiently supplied with nitrogen, phosphorus, and potassium as compared with similar leaves from fully manured plants. Nitrogen starvation decreases. potash deficiency considerably increases respiration, while phosphate has no effect. Assimilation rate falls in successive leaves in all cases, while subnormality due to manurial deficiency is specific in effect for the various manurial constituents, potash deficiency having the greatest effect.

MARX (D.). **The Effect of Small Electric Currents on the Assimilation of *Elodea canadensis*.** *Ann. Bot.*, XLIII, 163–172, 1929.

Electric currents of a density from 1·15 to 6 by 10–7 milliamps per cm^2 were passed through water in which shoots of Elodea were lying. In none of the experiments was the current found to increase the rate of assimilation, and with the higher currents the effect was a depressant one.

EXPERIMENTAL AND RESEARCH STATION, CHESHUNT, HERTS.

OWEN (O.). **The Analysis of Tomato Plants. Part I.** *Journ. Agric. Sci.*, 1929, Vol. XIX, p. 413.

Tomato plants were analysed for K_2O, P_2O_5, and N. Manured plants have a higher ash content than unmanured plants. It is probable that actively growing plants are richest in the three nutrients. The distribution of the total nutrients between the fruit and vegetative parts is different in manured and unmanured plants. The rate of growth of a tomato plant in a well manured soil is irregular, being influenced by cultural operations. Of all the trusses on a plant the third and fourth are richest in the three nutrients determined. The relative amount of potash in the whole of the aerial parts of the plant tends to fall as the season progresses.

(D) PLANT BREEDING AND VARIETY TESTING.

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

JENKIN (T. J.). **Pure Lines of Hen Gymro Wheat.** *Welsh Plant Breeding Stn.* Leaflet, Series S, No. 1. Feb., 1929.

A brief discussion by the Director of the Station, Professor R. G. Stapledon, M.A., dealing with the question of station-bred strains, is followed by a description of the old Welsh "land" wheat variety "Hen Gymro," together with an account of pure-line work within this variety. Results in comparison with those for Standard Red and obtained under Aberystwyth conditions are given, and also a brief description of five lines which are being propagated for further study and for general distribution.

STAPLEDON (R. G.) and JENKIN (T. J.). **The Improvement of Herbage Plants.** *Journ. B. D. F. A.*, vol. xli, p. 9. 1929.

A general discussion of the methods used in the improvement of grasses and clovers and the objects in view.

WILLIAMS (R. D.). **Comparative Agronomic Values of Red and White Clovers of Different Origin.** *Journ. Dept. Agric. Ireland*, Dublin, vol. xxviii, No. 1, p. 67, 1929.

The data considered in this paper are largely drawn from the results of the investigations at Aberystwyth. The importance of strain in red and white clovers is emphasised. In the case of red clover, it is shown that the late varieties, particularly Montgomery late and Cornish marl, are much better suited for the western and northern parts of the country than the early clovers on account of their greater productivity and longevity. The red clovers from South Europe are shown to be totally unsuitable to our conditions. A brief resumé of the chief characteristics of the most important varieties is given.

In the case of the white clovers, wild white is shown to be greatly superior to the ordinary white, with New Zealand white occupying an intermediate position.

NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.

ARMSTRONG (S. F.). **Trials of Autumn Sown Wheats, 1924–28.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A final report on a series of variety trials extending from 1924 to 1928 of the varieties Squarehead's Master Control, Iron III, Wilhelmina, Yeoman II, Little Joss, Fox, Cambridge Browick, Weibull's Standard and Setter at Cambridge and five sub-stations in other parts of England. Tables of yield results and the values per acre at each station are given, with a full commentary and review of the individual varieties.

HAWKES (F. C.). **The Effects of Intensive Manuring on Two Varieties of Wheat.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A note on trials carried out with Yeoman II and Squarehead's Master wheats at Cambridge in 1927 and 1928 to investigate the differential response of these varieties to normal and intensive manuring. There were indications that the extra manuring was profitable and that Yeoman II was a more suitable variety to choose for the purpose. These notes were also published in the *Journ. Min. Agric.*

HAWKES (F. C.). **Varieties of Cereals for Autumn Sowing.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A report on observation plots of 36 winter wheats, 9 winter oats and 6 winter barleys at Cambridge and five sub-stations. Descriptions are given of all the varieties of wheats and oats, with some general notes on the principal features of the varieties and the purposes for which they are best adapted. A summary of this report was published in the *Journ. Min. Agric.*

HAWKES (F. C.). **Varieties of Cereals for Spring Sowing.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A report on observation plots of 6 spring wheats, 34 spring oats, and 13 spring barleys at Cambridge and five sub-stations. Descriptions are given of all the varieties of wheats, oats and barleys with some general notes on the principal features of the varieties and the purposes for which they are best adapted. A summary of this report was published in the *Journ. Min. Agric.*

HUMPHRIES (A. E.), CLOVER (J. PERCY), and HUTCHINSON (ROBERT). **Quality for Breadmaking Purposes of Wheats Tested by the Institute between 1925 and 1927.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A final report on tests made by the Home Grown Wheat Committee of the quality for breadmaking purposes of the wheats from the yield trials described in the preceding reports. The methods of test and the principal results are described and the varieties are reviewed individually.

PARKER (W. H.) and BRYAN (H.). **Lord Derby Gold Medal Potato Trials, 1928.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A report compiled for the Lord Derby Gold Medal Award Committee on trials at Ormskirk in 1928 of—

(*a*) three new immune first early varieties—440, Arran Crest and Macbeth's Castle—against the standard varieties Epicure and Ninetyfold;

(*b*) six new immune maincrop varieties—The Baron, Cherry, Claymore, Electron, Incomer and Inverness Favourite—against the standard varieties Great Scot, Majestic and Kerr's Pink.

The report deals with the yield and maturity of the varieties and purity and freedom from disease, and announces that as a result of the trials a Gold Medal was awarded to Arran Crest and a Certificate of Merit to Incomer.

SALAMAN (R. N.). **Report of the Synonym Committee of the National Institute of Agricultural Botany for 1928.** *Journ. N. I. A. B.*, vol. ii, p. 170.

This report deals with the occurrence of synonyms as they occur in the Wart Immunity Potato Trials, as well as amongst many of the so-called novelties offered by the trade. It has been shown that certain well-known firms of seedsmen place on the market old varieties under new names, often at enhanced prices.

THOMPSON (E. G.). **Trials of Autumn Sown Oats, 1924–1928.** *Journ. N. I. A. B.*, vol. ii, No. 2, 1929.

A final report on a series of variety trials carried out between 1924 and 1928 of the varieties Grey Winter, Black Winter, Marvellous, Bountiful

and Plentiful. Tables of yield results, market valuations and proportion of husk are given with a full commentary and review of the individual varieties

PLANT BREEDING INSTITUTE, CAMBRIDGE UNIVERSITY.

SALAMAN (R. N.). **Genetic Studies in Potatoes—Abnormal Segregation in families arising from the cross, S. utile + S. tuberosum.** *Journ. Genet.*, vol. xx, No. 3, Jan., 1929, p. 311.

1. Crosses between *S. utile* and domestic potatoes have only taken place when *S. utile* acted as the maternal parent.

2. Whatever the domestic parent used, the F_1 family has been the same in all its external characters and, with the three exceptions noted in the text, the component individuals are identical. The variation of the three exceptional plants was, in regard to all their features, uniformly in the direction of *S. utile*, so that one could speak of a somatic mass mutation.

3. The crosses of *S. utile* + domestic potato have been traced through five generations, and certain back-crosses have been made.

4. The outstanding feature of the whole series has been the occurrence of families in the F_2, F_3, and F_4 generations pure in type and indistinguishable from the *S. utile* parent. This phenomenon is described as "mass segregation," and as related to the somatic mutation referred to above.

5. Evidence is adduced to show that, although these families are in their morphological characters indistinguishable from *S. utile*, there are genetic and physiological differences which are demonstrated by the result of back crosses, the presence of sterility and the incidence of disease.

6. No family pure to the domestic type has been recovered, although others occur where all the seedlings are "nearly" and some quite, domestic in character. The reason of the non-appearance of the pure domestic family may be due to the free segregation of the characters, especially those of the leaf. In two of these families a single individual has occurred with all the morphological characters of *S. utile* perfectly reproduced.

7. Differential morphological characters of the leaves of *S. utile* and the domestic potato are described, and their inheritance discussed.

8. Two features of the domestic leaflet are never lost in succeeding generations except when all the *S. utile* plant characters reappear en masse, viz., the sharp apical prominences to the leaflet and the angle of leaflet insertion which is always below 80°.

9. The recessive characters of "merging" derived from *S. utile* is greatly intensified in its expression, though still remaining recessive, in the presence of chromosomes bearing "domestic" characters.

10. The blue flower pigment of *S. utile* is dominant to the white and red of the domestic varieties. The factor determining deposition of pigment in the lower layers of the mesophyll of the corolla is dominant to that determining deposition in the upper. There is a close linkage between the factor for blue pigment and that for lower layer deposition, and also between that for red pigment apart from blue, and deposition in the upper layer of the mesophyll.

11. The cropping capacity, as measured by cropping curves of the families from *S. utile* by domestic crosses, demonstrates that the *S. utile*-like families of F_2, F_3, and F_4, whilst producing crop curves precisely the same as those of *S. utile*, are nevertheless carrying genes for higher cropping in a latent condition. There is clear evidence of segregation of cropping factors in the non-*utile*-like families, and in all families the inhibitory factors derived from *S. utile* are dominant.

12. In an inter-species cross, *S utile* + *S. chacoense*, both the F_1 and F_2 are completely of the *S. utile* type.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

FISHER (R. A.). **Two Further Notes on the Origin of Dominance.** *Amer. Nat.* 1928, vol. lxii, pp. 571–574.

The evidence of the behaviour of the cotton mutant, *Crinkled Dwarf*, investigated by Dr. S. C. Harland, is cited as demonstrating the natural evolution of dominance. This mutant is a clear recessive in the Sea Island cottons in which it occurs, but on crossing with other species the dominance of the wild type is found to be conditioned by a group of probably numerous modifiers in which the Sea Island has come to differ from other cottons.

It is suggested that the anomalous dominance of several breed characteristics in domestic poultry may be explained by the incidence of selection in early stages of domestication when the domestic flocks were frequently sired by wild jungle fowls.

SCOTTISH SOCIETY FOR RESEARCH IN PLANT BREEDING.

ROBB (WM.). **Some Potato Breeding Problems.** *Scott. Journ. Agric.*, vol. xii, No. 1, Jan., 1929.

The results obtained in several potato hybrids are described, and reference is made to the work of other potato breeders. In view of the complexity of the hereditary constitution of many cultivated varieties of potato it is suggested that the possibilities of self-fertilisation and inbreeding require to be further explored. The environmental conditions under which seedling potatoes are grown are important from the selector's point of view.

CAMBRIDGE UNIVERSITY.

DILLON WESTON (W. A. R.). **Resistance of Wheat Varieties to bunt, *Tilletia caries*.** *Nature*, Feb. 14, 1929.

Wheat varieties known to be resistant to *T. caries* have been made susceptible, notably Sherman, Ridit, Turkey, Hussar, and Berkeley Rock. If a bunted ear be obtained in a so-called resistant variety and this bunt be used to contaminate the seed of that variety, it is found that it becomes markedly susceptible to the disease. The conclusion is drawn that, *in the same way that the plant breeder may select a unit from a population of a variety for resistance to a certain pathogen, so the destructive mycologist may select a pathogen from an analogous population to which a given host is susceptible.*

WATKINS (A. E.). **The Genetics of Wheat Species Crosses. I.** *Journ. Genet.*, vol. xx, No. 1, July, 1928, pp. 1–27.

The paper deals with the inheritance of certain glume characters that are of importance in wheat classification.

OXFORD UNIVERSITY.

CUNLIFFE (N.). **A Report on Certain Oat Varieties in Relation to their Resistance to Attack by the Frit Fly in Sweden, together with Data concerning the Production of Resistant Utility Varieties.** *Ann. App. Biol.*, xvi, 1 Feb., 1929.

SOUTH EASTERN AGRICULTURAL COLLEGE, WYE, KENT.

SALMON (E. S.). **Twelfth Report on the Trial of New Varieties of Hops, 1928.** Ashford, August, 1929.

In all the classes (early, mid-season, and late-flowering) certain new seedling varieties proved to be richer in preservative qualities than any of the commercial varieties tested. Two new seedling varieties (raised from a "wild" hop from Manitoba, Canada) were richer in preservative qualities by 1·52 per cent. and 1·21 per cent. than the richest sample of American hops obtainable. Notes are given on the incidence of Downy Mildew and Mosaic disease. Certain new seedling varieties continue to show complete resistance to the Mosaic disease.

JOHN INNES HORTICULTURAL INSTITUTION.

ANDERSSON-KOTTÖ (I.). **A Genetical Investigation in *Scolopendrium vulgare*.** *Hereditas*, xii, 1929, pp. 109–178.

Scolopendrium vulgare, as known in cultivation is immensely polymorphic. Crosses between various types have given a still greater range of forms, some of which extend beyond the accepted taxonomic limits of the genus. These facts are discussed in relation to current phylogenetic theory concerning the ferns.

CRANE (M. B.) and LAWRENCE (W. J. C.). **Genetical and Cytological Aspects of Incompatibility and Sterility in Cultivated Fruits.** *Journ. Pom. and Hort. Sci.*, vol. vii, 4, 1929, pp. 276–301.

This is the sixth of a series of papers dealing with incompatibility and sterility in cultivated fruits. Three forms of "sterility" occur, viz., (1); Generational sterility; (2), Morphological sterility; (3), Incompatibility. Tables are given showing self- and cross-incompatibility in plums and cherries. Incompatibility occurs in apples, but generational sterility is present to a higher degree in these fruits than in cherries or plums. Odd multiple polyploids are generally unfruitful—e.g., triploid forms of *Rubus* and *Prunus* are highly sterile. In apples, however, some of our most productive varieties are triploids, and produce fruit freely in spite of considerable generational sterility. The relationship of polyploidy to sterility and fruit production and the genetical aspects of incompatibility are discussed.

DARLINGTON (C. D.). **Ring Formation in *Oenothera* and other Genera.** *Journ. Genet.*, vol. xx, 3, 1929, pp. 345–363.

A hypothesis is put forward that ring-formation is the result of continued segmental interchange and that ring-forming individuals are, in fact, structural hybrids. It is shown that this hypothesis is in accordance with all known data of breeding experiments and cytological observations.

DARLINGTON (C. D.). **A Comparative Study of the Chromosome Complement in *Ribes*.** *Genetica*, vol. xi, 1929, pp. 267–272.

Shows constancy of chromosome form in the genus.

DARLINGTON (C. D.) **Meiosis in Polyploids, II. Aneuploid Hyacinths.** *Journ. Genet.*, vol. xxi, 1, 1929, pp. 17–56.

Showing the principles on which the chromosomes associate in triploids and tetraploids and the mechanism of their segregation.

DARLINGTON (C. D.). **Polyploids and polyploidy.** *Nature*, 124, 1929, pp. 15.

An account of the origin of polyploids and the theory of their behaviour.

DARLINGTON (C. D.). **Chromosome Organisation and Structural Hybridity in the** *Tradescantiae*. *Journ. Genet.*, vol. xxi, 2, 1929, pp. 207–286.

An account of chromosome form and behaviour, showing that changes take place in the organisation of the chromosome which are reflected in the pairing of the chromosomes and account for ring-formation.

DARLINGTON (C. D.). **Variegation and Albinism in** *Vicia Faba*. *Journ. Genet.*, vol. xxi, 2, 1929, pp. 161–168.

An account of the inheritance of a new type of variegation.

DE WINTON (D.). **Inheritance in** *Primula sinensis*. *Journ. R. H. S.*, vol. liv, 1929. pp. 7.

A popular account of inheritance in *P. sinensis*, given at the Primula Conference at the Chelsea Show in 1928.

GAIRDNER (A. E.). **Male-sterility in Flax, II. A Case of Reciprocal Crosses differing in F_2.** *Journ. Genet.*, vol. xxi, 1, 1929, pp. 117–124.

Male sterility first arose in the F_2 generation from a procumbent pollinated by a tall plant. From the reciprocal cross there were none. The suggestion is put forward that there is a difference in the cytoplasmic constituents of the two strains apart from the factors carried by the nucleus.

HALL (Sir A. DANIEL). **Bateson's Experiments on Bolting in Sugar Beet and Mangolds.** *Journ. Genet.*, vol. xx, 2, 1928, pp. 219–231.

Strains were obtained by selection which were resistant to bolting under conditions much more stringent than the normal. Tables are given summarising the results of work at the John Innes Horticultural Institution extending over a number of years.

HUSKINS (C. L.). **Criteria of Hybridity.** *Science*, vol. lxix, 1789, pp. 399–400.

The criteria generally invoked as proof of hybrid origin are examined and the necessity for caution in their application is emphasised.

HUSKINS (C. L.). *Primula Juliae* **and its Hybrids with the Primrose and the Oxlip.** *Journ. R. H. S.*, vol. liv., 1, 1929, pp. 6.

A semi-popular account of the hybridisation studies made at the John Innes Horticultural Institution between various garden forms of primula and the wild primrose, oxlip, cowslip and *P. Juliae*.

LA-COUR (L.). **New Fixatives for Plant Cytology.** *Nature*, 124, 1929, pp. 2.

A description of certain new stains (chiefly for chromosomes) used at the John Innes Horticultural Institution.

LAWRENCE (W. J. C.). **The Genetics and Cytology of Dahlia Species.** *Journ. Genet.* vol. xxi, 2, 1929. pp. 125–159.

With the exception of *D. variabilis*, *Dahlia* species may be arranged in two flower colour groups: (*a*) ivory, magenta or purple; (*b*) yellow, orange or scarlet. *D. variabilis* unites both series within itself.

Five species examined are tetraploids. *D. variabilis* is an octaploid ($2n=64$). Multiple association of the chromosomes is very pronounced in *D. variabilis*.

Breeding results show that the factors Y (yellow flavone) and I (ivory flavone) have tetrasomic and disomic inheritance respectively.

It is suggested that *D. variabilis* is an allo-octaploid derived by doubling of the chromosome complement of a tetraploid hybrid between representatives of the two colour groups.

NEWTON (W. C. F., the late) and DARLINGTON (C. D.). **Meiosis in Polyploids. I. Triploid and Pentaploid Tulips.** *Journ. Genet.*, vol. xxi, 1, 1929, pp. 1–15.

Showing how multivalent bodies arise in polyploids.

NEWTON (W. C. F., the late) and PELLEW (C.). *Primula kewensis* **and its Derivatives.** *Journ. Genet,* vol. xx, 3, 1929, pp. 405–466.

A detailed account of the cytological and genetical work done on this species at the John Innes Institution since 1922. The partially sterile hybrid, *P. kewensis*, derived from *P. floribunda* x *P. verticillata*, is shown to have given rise to the fertile tetraploid hybrid by doubling of the chromosome complement in the somatic cell divisions. Variability in the tetraploid hybrid is found to be connected frequently with the loss, or gain, of single chromosomes.

NEWTON (W. C. F., the late) and PELLEW (C.). *Primula Kewensis* **and its Derivatives.** *Journ. R. H. S.*, vol. liv, 1, 1929, pp. 4.

A popular account of the origin and behaviour of *Primula kewensis*, given at the Primula Conference at the Chelsea Show in 1928.

(E) SEEDS AND WEEDS.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS

BRENCHLEY (W. E.) and WARINGTON (K.). **The Weed Seed Population of Arable Soil. I. Numerical Estimation of Viable Seeds and Observations on their Natural Dormancy.** *Journ. Ecol.*, vol. xviii.

Counts have been made of the seedlings germinating from soil samples of known area taken from fields undergoing specified schemes of fallowing. Poppy was the most plentiful weed, an average of 113 millions per acre being recorded.

Most species exhibited a periodicity in germination, the majority of seedlings appearing in the autumn or winter. Many weeds showed a period of "natural" dormancy, during which they failed to germinate in spite of favourable conditions.

An association was found between the weed flora and the manurial treatment of the soil when the same manuring is repeated for a large number of years.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

MERCER (S. P.). **Sampling of Seeds.** *Actes du V-ieme Congres de l'Association international d'essais de semences.*

Various methods of mixing and sampling are examined statistically. Pouring in superposed streams is found to give the most satisfactory uniformity of mixture and the method of repeated division to give the most representative sample. Agreement between duplicate purity tests does not connote accuracy.

MERCER (S. P.). **The Ryegrass Seed Industry in Northern Ireland.** *Agric. Prog.*, vol. vi., 1929.

Difficulties in growing, maturing, storing and shipping ryegrass seed are discussed. Effects of manuring the crop and stage of maturity at harvest, upon the quality and keeping capacity of the produce are noted. The causes of loss in germination often incident to tropical passages are examined.

(F) HORTICULTURE, FLOWERS, BEES.

LONG ASHTON FRUIT RESEARCH STATION.

MAYNARD (J. G.). **The Production of English Dessert Apples.** *Essex F.U. Journ.*, 1929.

A paper giving expression to certain aspects of the production of dessert apples in England. A particular point is made of the importance of high quality production, special stress being laid on colour. Several methods of obtaining high colour on different types of land are discussed. Particular stress is laid on the importance of spraying, and it is suggested that in the case of established orchards, spraying is much more important than even cultivations.

MAYNARD (J. G.). **Strawberry Variety Identification (Interim Report).** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton*, 1928.

A paper on progress in strawberry variety classification dealing with certain botanical characters of obvious utility for classification. The most important of these deals with the type of hair on petiole, flower stem and stolon. Preliminary tables are given for 28 varieties and certain points with regard to identification of individual varieties are stressed.

HORTICULTURAL RESEARCH STATION, CAMBRIDGE.

WRIGHT (C.). and WARD (J. F.). **A Survey of the Soils and Fruit of the Wisbech Area.** *Min. Agric. Res. Mono. No.* 6.

This monograph contains an account of a survey of fruit soils in the Wisbech district and is the first of the series of surveys recommended by the Conference of Advisory Chemists in 1922. It is divided into four parts with ten appendices and three maps. Part I deals with soils, Part II with fruit, and Part III with the relation between soil and fruit in the district concerned, which comprises an area of 36 square miles lying around and to the west of the town of Wisbech.

HORTICULTURAL RESEARCH STATION, EAST MALLING.

AMOS (J.) **Red Currant Varieties.** *Kent Cherry and Soft Fruit Show Catalogue*, 1927. *East Malling Res. Stn. Ann. Rep.* 1928, April, 1929. (I.—General.) 73–79.

A key to the identification of the main varieties of red currant in commercial use from leaf characters is suggested for use in the nursery. General notes as to the economic value of representatives of the five main groups and of several distinct varieties are given.

BAGENAL (N. B.), GOODWIN (W.), and HATTON (R. G,). **Proposed Fruit Soils Survey in Kent. An Account of its Scope and Methods.** *Journ. Kent F.U.*, Dec., 1928, 24. 225–226.

The methods and objects of the survey are explained. The area to be covered and reasons for choice are outlined.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

Imms (A. D.) and Morland (D. M. T.). **Progress of Bee Investigations at Rothamsted.** *Bee World*, vol. x, 1929, pp. 26–28.

The contents of this article are explained by the title.

Morland (D. M. T.). **A Recording Scale for Bee Hives.** *Ann. App. Biol.*, 1929, vol. xvi, pp. 294–298.

The use of a hive on scales, the weight of which is recorded at least daily during the season, is to be strongly advised in any apiary. Unfortunately such a procedure is seldom adopted in Great Britain. It enables progress of the colonies to be watched and the seasonal effects thereon noted—the main object being to note the tendency of the weight changes whether they be towards an increase or a decrease. Details are given of the construction of a sensitive recording balance now in use at the Rothamsted apiary. It is relatively simple in its details and not expensive to construct.

Morland (D. M. T.). **The Feeding of Bees.** *Journ. Min. Agric.*, 1929, pp. 945–950.

This paper deals with certain problems relative to the feeding of bees, and the chief conclusions, based upon experiments carried out at Rothamsted, are summarised below.

(1) That the prejudice that has existed among bee-keepers against beet sugar has little or no foundation at the present day.

(2) That the indiscriminate addition of drugs and disinfectants to bee syrup is unwise, as we do not know what effect they have on the inversion of the sugar.

(3) That the methods usually employed by beekeepers for inverting the syrup with weak organic acids are ineffective and in the end defeat their intended result.

(4) It would be better to start autumn feeding earlier than is frequently done, and, by feeding less concentrated syrup at a slower rate, to let the bees do their own inverting. It is sometimes objected that this leads to breeding rather than storing. It is preferable to have more young bees for spring and less old bees for winter at the expense of a few pounds of syrup.

(G) PLANT PATHOLOGY
(not classifiable under H, J and K).

DEPARTMENT OF AGRICULTURE FOR SCOTLAND. PLANT PATHOLOGICAL LABORATORY.

The International Aspect of Plant Diseases.—British Association, South Africa.

SEALE-HAYNE AGRICULTURAL COLLEGE, NEWTON ABBOT, DEVON.

Hodson (W. E. H.) and Beaumont (A.). **Fifth Annual Report of the Department of Plant Pathology for the Year ending 30th September, 1928.** *Pamph, No.* 30, *Seale-Hayne Agric. Coll., Newton Abbot,* 1929. *Abstract in Rev. App. Entom,* xvii, pt. 9, pp. 498–499.

Beaumont (A.) and Hodson (W. E. H.). **Fifth Annual Report of the Department of Plant Pathology.** *Pamph. No.* 30, *Seale-Hayne Agric. Coll., Newton Abbot,* 1929. *Abstract in Rev. App. Myco.*, viii, pt. 10, p. 628.

Hodson (W. E. H.) and Beaumont (A.). **Daffodil Growing for Pleasure and Profit** (by A. F. Calvert). Ch. xxv, pp. 267–287. **Pests and Diseases of the Narcissus.** *Dulau, London,* 1929.

SOUTH EASTERN AGRICULTURAL COLLEGE, WYE.

Goodwin (W.) and Martin (H.) **The Action of Sulphur as a Fungicide and as an Acaricide. Pt. I.** *Ann. App. Biol.*, Nov., 1928, vol. xv No. 4, pp. 625–638.

The volatile agent produced when sulphur is applied to a heated surface and not to the plant or fungus was investigated by chemical methods and it was found (1) that the volatile agent is capable of passing a glass-wool filter maintained at the temperature of the heated surface ; (2) that the volatile agent was removed by a cooled glass-wool filter and could not, therefore, be sulphur dioxide or sulphuretted hydrogen but elementary sulphur ; (3) that the condensation of sulphur volatilised from the heated surface appears sufficient to account for the reactions ascribed to particulate sulphur.

Goodwin (W.) and Martin (H.). **The Action of Sulphur as a Fungicide and as an Acaricide. Pt. II.** *Ann. App. Biol.*, Feb., 1929, vol. xvi, No. 1, pp. 93–103.

The conclusions drawn from the results obtained in Pt. I of the investigation were subjected to biological tests using the fungi *Erysiphe graminis* and *Sphaerotheca Humuli* and the gall mite *Eriophyes ribis*. Support is given to the view that actual contact of the sulphur particle with the fungus is necessary before fungicidal action can take place. The results of the tests with the gall mite were in accord with the previous chemical work. The gall mite was found not to be permanently affected by relatively large concentrations of sulphur dioxide and sulphuretted hydrogen.

(H) ENTOMOLOGY.

LONG ASHTON FRUIT RESEARCH STATION.

STANILAND (L. N.) and WALTON (C. L.). **The Uses of Naphthalene for the Control of Certain Pests of Market Gardens.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928.

This paper records the successful use of "Whizzed" napthalene against the Flea Beetle, *Psylliodes chrysocephala,* attacking young brassicae; the carrot fly, *Psila rosae,* on celery and a millepede, *Blanjulus sp.* affecting potatoes, all in the Bristol market garden area. The method employed consisted of repeated applications at the rates of 1 oz. and ½ oz. per square yard chiefly as surface dressings and deterrents.

STANILAND (L. N.) and WALTON (C. L.). **The Long Ashton Tar-Distillate Wash. Field Experiments, 1927–28.** *Journ. Min. Agric.,* Nov., 1928.

Results are given of field trials at three centres near Cheltenham. A wash made up at Long Ashton was tested against a "Standard" commercial wash at 6 per cent. and 10 per cent. strengths.

Apple Sucker was completely controlled at both strengths by both washes, and a commercial control of caterpillar was obtained at 10 per cent.

Capsid bug (*Plesiocoris*) was controlled at 10 per cent. by the Long Ashton Wash, at which strength "Standard" effected a reduction only. At 6 per cent. neither was satisfactory, although Long Ashton Wash was the superior. The effect of tar-distillate spray drift on under crops was studied and showed that growers should allow at least a week between spraying and sowing under fruit trees.

STANILAND (L. N.) and WALTON (C. L.). **The Long Ashton Tar-Distillate Wash. Field Experiments, 1929.** *Journ. Min. Agric.,* Sept., 1929.

These experiments included apples (eleven centres), plums (three centres) and black currants (three centres), and were chiefly concerned with the control of the apple capsid bug. (1) The Long Ashton Wash; (2) a modification thereof, and (3) a proprietary "Standard" were used at varying strengths This paper only deals with the leaf and young fruit markings by capsid bugs. The outstanding results were the consistent control effected by the Long Ashton Wash at 10 per cent. strength, and the effective control of caterpillars at 6 per cent. by both the Long Ashton Wash and the Modified Wash.

TUTIN (F.). **The Preparation of a Pyrethrum Spray Fluid.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928.

The active principles present in pyrethrum flowers may be extracted readily by means of light petroleum.

The extracted active principles, when dissolved in a fatty oil, such as rape oil, may be emulsified conveniently by means of Agral W.B.

An emulsion prepared in this manner, representing a concentration of 1 per cent. of the original flowers, when used as a spray, is rapidly fatal to a large variety of insects, including some which cannot be controlled by means of nicotine or by arsenates, but it causes no damage even to the most delicate vegetation.

WALTON (C. L.). **Some Present-day Aspects of Agricultural Zoology. A résumé of research.** *E.C.F.U.Y.B.*, 1929.

After a discussion and definition of agricultural zoology and its application and a brief resumé of the development of the subject to its present stage in this country, a series of examples is given illustrating the advances made in connection with various parasites and pests, together with some remarks as to work in progress or still desirable.

HORTICULTURAL RESEARCH STATION, CAMBRIDGE.

WOODMAN (R. M.). **Notes on Dual Emulsion, with Examples of Interest in the Spraying of Trees.** *Journ. Phys. Chem.* 1929, **33**, pp. 88–94.

Ovicidal and insecticidal emulsions must, for the following reasons, be of the oil-in-water type:—

1. As water is the continuous phase of the emulsion, no injury is done to the plant.
2. The emulsion can undergo the necessary dilutions by water in the field. Any emulsifier yielding water-in-oil types is, therefore, unsuitable for making spraying emulsions of that oil. Some emulsifiers yield both types of emulsions with certain oils, and these also are unsuitable. Examples are:—
   (*a*) Emulsification of tar acids with gelatine solution.
   (*b*) Emulsification of phenol, cresylic acid, haxalin, methylhexalin and certain petroleum fractions with potassium oleate (soft soap) solutions. In these cases the undesirable type of emulsion occurs at those concentrations of oil which spray manufacturers would use when preparing stock emulsions.

HORTICULTURAL RESEARCH STATION, EAST MALLING.

LE PELLEY (R.). **Note on the use of Tar Distillate Spraying and of Greasebanding against the Woolly Aphis of Apple** (*Eriosoma lanigerum* Hausm.). *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 153–156.

The following points appear from the tests and discussions:—

1. The efficacy of grease-banding as a control measure for Woolly Aphis seems to be limited by the fact that the insect can usually overwinter above ground in this country, and that it is very difficult to ensure the destruction of all these overwintering insects and by the difficulty of applying the bands in commercial practice (especially on old trees or trees with a rough bark) sufficiently soundly to prevent a small number of insects from finding a way up.

2. Tar-distillate spraying for the specific object of controlling Woolly Aphis would not usually be an economical measure.

3. In addition to its other uses a tar-distillate wash destroys a large proportion of the Woolly Aphis hibernating above ground, and this should be taken into account when assessing the general value of tar-distillate spraying. Its application should considerably decrease the labour of "hand-painting" the colonies of the insect where this palliative measure is employed.

Massee (A. M.), Steer (W) & Goodwin (W.). **Further Experiments with Tar Distillate Washes.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II Supplement, 137–150.

Experiments with tar-distillate washes carried out at East Malling Research Station in 1926 and 1927 are described.

Attention is called to certain improvements in technique and in the methods of obtaining adequate supplies of material (i.e., eggs).

The experiments showed :—

1. That the percentage of viable eggs of the Vapourer Moth (*Notolophus antiquus* L.) killed by a tar-distillate wash ("Standard B") rises with the concentration of the wash. The 5 per cent. concentration did not, as in the 1925 experiment, give a disproportionately high kill.

2. That in the comparison of a standardised tar-distillate ("Standard B") with a proprietary preparation, used at equal strengths, the former killed 83 per cent. and the latter 69 per cent. of the viable eggs of the Vapourer Moth.

3. That two tar-distillates, one containing low boiling tar acids and the other high boiling tar acids, gave almost identical kills when tested on eggs of the Vapourer Moth, the first preparation giving an average kill of 90 per cent., and the second 94 per cent. of the viable eggs.

4. That a standardised tar-distillate ("Standard A") at 10 per cent. killed 93 per cent. of the viable eggs of the Vapourer Moth.

5. That tar-distillate preparations, dichlorbenzene, and mixtures of tar-distillates and dichlorbenzene, were all ineffective against the eggs of the Fruit-Tree Red Spider (*Oligonychus ulmi* C. L. Koch) at the strengths used.

6. That the two standardised tar-distillate washes ("Standard A" and "Standard B") were only moderately toxic to eggs of the Lackey Moth (*Clissiocampa neustria* L.) under the conditions described, the percentages of viable eggs killed by these washes being 56·5 and 68, respectively.

7. That a tar-distillate wash ("Standard A") was not toxic to the Black Currant Gall Mite (*Eriophyes ribis* (Westw.) Nal.) when used as a winter wash and at a concentration of 10 per cent.

Massee (A. M.). **Notes on Insect Pests for the Years 1926–27.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II Supplement, 157–162.

The following insect pests are discussed in this report.

The Apple Bud Weevil (*Anthonomous cinctus* Koll.); the Pear and Cherry Slugworm (*Eriocampa limicina* Cam.); the Apple Mite (*Phyllocoptes schlechtendali* Nal.); the Lilac Mites (*Eriophyes lowi* Nal. and *Phyllocoptes massalongoi* Nal.); Capsid Bugs *Lygus pratensis*, *Plesiocoris rugicollis* and *Lygus pabulinus*; the Fruit Tree Red Spider (*Oligonychus ulmi* C. L. Koch); the Raspberry Mite (*Eriophyes gracilis* Nal.). Reference is also made to slugs destroying hops in the spring.

Massee (A. M.). **A New Eriophyid Mite on Black Currant.** *Ann. and Mag. Nat. Hist.*, Ser. 10, Feb., 1929, **3**, 213.

A systematic description of a new species of Gall Mite (*Anthocoptes ribis* sp. n.) of black currant is given.

MASSEE (A. M.). **The Fruit Tree Red Spider.** *East Malling Res. Sta. Ann. Rep.* 1928, Apr., 1929, I—General, 116–122.

An account is given of the life-history and the distribution of the Fruit Tree Red Spider.

The host plants are recorded together with remarks upon susceptible varieties of fruit.

The damage caused by the mite is also described and control measures are outlined.

MASSEE (A. M.). **The Black Currant Gall Mite on Red Currants.** *East Malling Res. Sta. Ann. Rep.* 1928, Apr., 1929, I—General, 123–124.

The symptoms of the disease, the means of detecting the mite in the plantations, and notes on the habits of the mite are described. Control measures are very briefly discussed.

MASSEE (A. M.). **The Occurrence of** *Gnorimus nobilis* **L. in Kent.** *Ent. Mon. Mag.*, Apr., 1929, 65, 93.

The occurrence of this rare beetle in the larval stage in old plum trees is recorded from two localities in Kent.

MASSEE (A. M.). **Note on the Apple Blossom Weevil.** *Gard. Chron.*, May, 1929, 3rd Series, 85, 393.

Observations show that the Apple Blossom Weevil feeds on the apple foliage prior to the oviposition period. The damage caused by the weevil is sometimes very considerable. Feeding takes place mainly at night.

MASSEE (A. M.) and STEER (W.). **Tar Distillate Washes and Red Spider.** *Journ. Min. Agric.*, June, 1929, 36, pp. 253–257.

Observations on *Anthocoris nemorum*, a bug which preys extensively on Red Spider, show that it (and insects with similar habits) may be adversely affected by the use of tar-distillate washes. This may partly account for the rapid increase of Red Spider where these washes are used on fruit trees. Notes on the control of Red Spider are given.

MASSEE (A. M.) and STEER (W.). **The Hatching of** *Calocoris norvegicus* **Gmel.** *Ent. Mon. Mag.*, July, 1929, 65, 160.

This capsid, which had previously been observed to lay eggs in chestnut fence posts in August, 1928, was found to be hatching in numbers in June, 1929, from eggs laid in the same posts.

MASSEE (A. M.). **Note on Plum Leaf Hoppers.** *Ent. Mon. Mag.*, September, 1929, 65, 206–207.

The oviposition of the Plum Leaf hoppers *Typhlocyba quercus* Fab. and *Zygina coryli* Collin is described. Eggs are laid in the stems and branches of plum trees during October. The leaf hoppers emerge during May.

MASSEE (A. M.). **Two Species of Gall Mites (*Eriophyidae*) of the Lilac (*Syringa vulgaris* L.) New to Britain.** *Bull. Ent. Res.*, Dec., 1928, 19, 259–260.

Systematic descriptions of the two species of Lilac Gall Mites are given. *Eriophyes lowi* Nal. causes the so-called big buds and infests the newly developing buds.

Phyllocoptes massalongoi Nal. causes two types of damage. First, the mites feed upon the leaves, causing a yellow brown mottling of the upper surface. Secondly, the mites attack the unopened flowers, the developing flower buds and the fruits.

STEER (W.). *Dicyphus errans* **Wolff and other Capsidae on Potatoes in Kent.** *Ent. Mon. Mag.*, Oct., 1928, 64, 236–237.

This is a record of the potato as a host plant of the Capsid *Dicyphus errans* Wolff, in Kent.

Other Capsidae found commonly in the nymphal stages on potatoes during 1928 were *Lygus pratensis* L. and *L. pabulinus* L. The latter, a bad pest of red and black currants, gooseberries, etc. has a summer generation on potatoes and various weeds. It was found at the East Malling Research Station that the hop is also an important summer host of *L. Pabulinus*.

STEER (W.). **The Eggs of Some Hemiptera-Heteroptera.** *Ent. Mon. Mag.*, Feb., 1929, 65, 34–38.

The eggs of *Calocoris norvegicus* Gmel., *C. fulvomaculatus* De Geer, and *Nabis apterus* F. are described. The eggs of *norvegicus* are laid in fence posts and those of the other species in hop-poles.

STEER (W.). **Note on** *Anthocoris nemorum* L. **(Hemiptera-Anthocoridae).** *Ent. Mon. Mag.*, May, 1929, 65, 103–104.

The habits of this bug are described. It preys extensively on red spiders and is possibly adversely affected by the use of tar-distillate winter washes.

STEER (W.). **Capsidae Found on the Genus** *Rubus*. *Entomologist*, May, 1929, 62, 101–108.

A list of the species of capsids found on raspberries, loganberries and related plants, with notes on the life-histories and habits of some of them.

STEER (W.). *Calocoris norvegicus* **on Mullein.** *Ent. Mon. Mag.*, September, 1929, 65, 209–210.

This appears to be a new host record for this capsid, which swarmed on the flower spikes of mullein plants in a garden and prevented the flowers from opening.

MINISTRY OF AGRICULTURE AND FISHERIES, PLANT PATHOLOGICAL LABORATORY.

FRYER (J. C. F.). **Polymorphism in the Moth** *Acalla comariana* **Zeller.** *Journ. Genet.*, xx, pp. 157–178.

By means of breeding experiments the inheritance phenomena in six forms of this species are analysed and it is suggested that wing coloration is due (*a*) to a series of three multiple allelomorphs governing ground colour and (*b*) to two factors governing the colour of the costal blotch, there being a close linkage between the factors concerned with ground colour and those for costal blotch, all the factors being in a pair of autosomes. The incidence of the different forms in Cambridgeshire and Lancashire is discussed.

GIMINGHAM (C. T.) **An Introduced Capsid Injurious to Orchids.** *Ent. Mon. Mag.*, vol. 64, p. 272, Dec., 1928.

A brief account of the occurrence of the South American Capsid Bug, *Tenthecoris bicolor* Scott, on orchids in Europe and North America, with notes on the synonomy of the insect.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

BARNES (H. F.). **Two Gall Midges (Cecidomyidae) found in stored Products.** *Bull. Ent. Res.*, 1929, vol. xx, pp. 119–122.

Describes two new species of gall midges affecting stored products on the Continent, both species probably being more or less beneficial since their larvae possibly prey upon mites.

BARNES (H. F.). **The British Gall Midges of Peas.** *Bull. Ent. Res.*, 1928, vol. xix, pt. 2, Oct., pp. 183–185.

Three species of these insects are dealt with in this article, of which one is directly injurious, another is predatory on the former, while the third species is an inquiline. The latter species, *Clinodiplosis pisicola* Barnes, is described as new.

BARNES (H. F.). **"Button Top" of Basket Willows.** *Journ. Min. Agric.* 1929, vol. xvi, pp. 65–71.

Describes the galls produced by larvae of the midge *Rhabdophaga heterobia* H. Lw. on the shoots of basket willows. This insect has two main broods in the year but, since they overlap, midges are continuously on the wing from the end of April until September. Besides attacking the terminal buds the larvae also infest the catkins and the lateral buds; pupation takes place in the affected buds. Control measures are discussed and it is pointed out that the habit of leaving the cut rods lying in the fields allows of the larvae entering the soil and thus spreading the trouble the following year. The measures suggested involve the prompt collection of all cut rods and certain modifications of procedure when transferred to storage.

DAVIDSON (J.). **On the Occurrence of the Parthenogenetic and Sexual Forms in *Aphis rumicis*, with special Reference to the Influence of Environmental Factors.** *Ann. App. Biol.*, 1929, vol. xvi, pp. 104–134.

Among the more important features brought forward in this paper the following, among others, are noteworthy.

Ten related lines of *Aphis rumicis* L. have been reared in which parthenogenetic individuals were obtained in successive generations extending over varying periods: the longest period was 2 years 10 months, 50 generations having been passed through.

The alate dispersal forms are usually offspring of alienicolae apterae, but may also be produced by the alatae; their occurrence in the various alienicolae generations is affected by overcrowding, nutrition and temperature; they normally produce apterae, but under adverse conditions may also produce alatae.

With suitable environmental conditions the parthenogenetic alienicolae generations may be maintained experimentally for long periods, and the sexual phase may be induced or suppressed depending on the factors of light length of day) and temperature. The effect of nutrition (if any) due to the influence of these factors on the plant has not been determined.

DAVIDSON (J.) and HENSON (H.) **The Internal Condition of the Host Plant in Relation to Insect Attack, with Special Reference to the Influence of Pyridine.** *Ann. App. Biol.*, 1929, vol. xvi, pp. 458–471.

It is known that it is possible to administer to the roots of broad beans certain substances which are absorbed and transferred to the leaves and stems. In experiments in which pyridine was used it is shown that this substance, in suitable concentrations, exercises a marked detrimental effect upon the aphids. There are many features which render the exact conditions rather difficult to define. The great majority of these features are concerned with the conditions governing absorption by the plant and with the effect of the pyridine on the plant after absorption. It was noticeable in the sand experiments that the effect on the aphids was to a large extent proportional to the amount of pyridine administered to the plant. The experiments in which dry weights of treated and control plants were compared shows quite plainly that a very evident effect is caused by the pyridine. In experiments on plants growing in soil the pyridine appeared to have a much less detrimental effect on the plants. It still had a very obvious effect on the aphids when present in sufficiently high concentration. This concentration had to be much higher than was the case with plants grown in sand.

DAVIES (W. M.). **Notes on the Feeding Habits of *Habrosyne derasa* L. (Lepidoptera).** *Bull. Ent. Res.*, 1928, vol. xix, pt. 3, Dec., pp. 267–270.

Experiments are described in connection with the biological control of bramble in New Zealand. Larvae of *Habrosyne derasa* which are well-known bramble feeders were tested with reference to the possibility of their attacking related plants. Newly hatched larvae were simultaneously tested as to their ability to thrive on a variety of cultivated rosaceous fruit trees and bushes. The experiments showed that the larvae will feed equally well on raspberry and loganberry as well as under certain conditions on rose and apple and pupate normally. Examples transferred to cherry, plum and pear fed upon these plants but failed to complete their transformations. The investigations indicate that the insect should not be introduced into New Zealand, unless further experiments justified it..

FISHER (R. A.) and FORD (E. B.) **The Variability of Species in the Lepidoptera with Reference to Abundance and Sex.** *Trans. Ent. Soc. Lond.*, 1929, vol. lxxvi, pp. 367-384.

The frequency distribution of depth of pigment in the ground-colour of the forewings of 35 species of British moths has been obtained by comparison of over 5,000 specimens with a standard colour scale.

After adjustment, the mean variance is about 30 per cent. higher in females than in males, and is in both sexes greatest in the abundant species, and least in those which are less than common.

TATTERSFIELD (F.), HOBSON (R. P.) and GIMINGHAM C. T.) **Pyrethrin I and II. Their Insecticidal Value and Estimation in Pyrethum (*Chysanthemum cinerariaefolium*) I.** *Journ. Agric. Sci.*, Apl., 1929, vol. xix, pt. II, pp. 266–296.

Pyrethrin I and II have been isolated by the method of Staudinger and Ruzicka from the insecticidal plant (*Chrysanthemum cinerariaefolium*). Both are shown to be highly toxic to the insect *Aphis rumicis*.

Pyrethrin I was found to be the most toxic substance so far tested by the authors.

Two micro-analytical methods of determining the pyrethrin content are described. (*a*) By means of the acids after hydrolysis; (*b*) by means of the semicarbazone.

The analytical results obtained for a series of pyrethrum samples agreed with their observed insecticidal properties to *Aphis rumicis*.

TATTERSFIELD F. and HOBSON R. P. **Pyrethrin I and II. Their Estimation in Pyrethrum** *Chrysanthemum cinerariaefolium* II. *Journ. Agric. Sci.*, July, 1929, vol. xix, pt. III.

The acid method previously described has been used to evaluate samples of pyrethrum derived from both Swiss and Japanese seed, with equally successful results.

A rapid method for the evaluation of pyrethrum by a determination of pyrethrin I is described.

TATTERSFIELD F. and GIMINGHAM C. T. **Laboratory Experiments with Non-arsenical Insecticides for Biting Insects.** *Ann. Appl. Biol.*, Nov., 1928, vol. xv., No. 4.

A convenient technique for experiments for biting insects is described.

The silicofluorides of sodium potassium aluminium and calcium, used in the form of spray fluids, showed considerable toxicity to young larvae of several species of moths. The degree of resistance varies with different species and is greater with older larvae. Considerable, but irregular, injury to foliage was noted and much further work is required to establish the conditions under which these compounds could be safely used.

Foliage sprayed with extracts of derris and tropical plants is extremely repellant to young larvae.

A short review of some recent work on laboratory experiments with non-arsenical insecticides for biting insects is given.

IMMS A. D. **Some Methods of Technique applicable to Entomology.** *Bull. Ent. Res.*, vol. xx, 1929, pp. 165–171.

Describes methods of technique applicable to entomology that have been used by the author in the course of a number of years' experience. It deals with methods of mounting, staining, preserving and rearing insects adapted for different lines of investigation, and has been written with a view to assisting research workers both in this country and in other parts of the Empire.

IMMS A. D. Articles "Insects," "Entomology," "Economic Entomology" and "Social Insects." *14th Edition Encycl. Brit.*

These are major articles explaining their subjects in a general way and require no further comment.

EXPERIMENTAL AND RESEARCH STATION, CHESHUNT.

SPEYER E. R. **The Red Spider Mite** *Tetranychus telarius* L. *Journ. Pom. and Hort. Sci.*, viii, (3), 161–171, 1929.

An account is given of the seasonal habits and summer life cycle of the red spider mite (*Tetranychus telarius*) in glasshouses. The use of petroleum and "lover of sulphur" sprays to control the pest on growing plants is described. Details are given of the method adopted for fumigating cucumber houses with pure naphthalene during the growing season and tomato

and cucumber houses with crude naphthalene at the end of the season to destroy the mites before they hibernate.

The washing down of houses with cresylic acid as a winter treatment and methods of trapping the mites as they leave the plants are described. The necessity for structural cleanliness and the storage of staging away from weeds which may harbour the pest are emphasized.

SPEYER (E. R.). **The Greenhouse White-fly** (*Trialeurodes vaporariorum*, Westwood). *Journ. R.H.S.*, liv, 13, 181–192, 1929.

The habits, life history and chief host plants of the greenhouse white-fly are given. Artificial methods of control by fumigation with "Cyanide" and tetrachlorethane, including recent modifications of the former, are described in detail. An account is given of the occurrence and life history of the Chalcid parasite *Encarsia formosa* Gahan, which exerts a biological control of the white-fly except when the pest occurs on certain specified plants which appear repellent to the parasite. The methods adopted by the author for breeding and distributing large quantities of this parasite are discussed.

The life history of the white-fly and its parasite are illustrated.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

JENKINS (J. R. W.). **Observations on the Control of Weevils of the Genus *Apion* attacking Red Clover.** *Welsh Journ. Agric.*, vol. v, 1929.

The observations and experiments relate to the species *Africanus*, *assimile* and *rubidi*, which possess flowerhead feeding larvae, and are thus detrimental to seed production. It is shown that on 25 farms in the seed producing districts of Montgomeryshire, these pests caused an average monetary lost of 25s. per acre.

Observations showed that by taking advantage of the fact that desiccation such as occurs during haymaking is fatal to larvae but not to pupae, and by adjusting the time of the hay cut to ensure maximum larval mortality, that is at the 25 per cent. full flower stage, a 77 per cent. kill could be obtained.

UNIVERSITY COLLEGE OF NORTH WALES, BANGOR.

DAVIES (W. M.). **Hibernation of *Lucilia sericata* Mg.** *Nature*, vol. cxxiii, No. 3107, pp. 759–760, May 18th, 1929.

The study of the hibernation of the particular species *Lucilia sericata* resulted from a survey in 1928, which showed that *sericata* was the only species of Maggot Fly attacking sheep in North Wales.

All larvae, direct from infested sheep, received between May 5th and September 8th pupated and emerged after normal duration of the respective stages. Larvae received subsequently did not pupate and under out-of-door conditions remained buried in the soil throughout the winter as larvae in a quiescent state. Viable larvae were obtained from frozen soil after a minimum atmospheric temperature of 16° F. During March 20-26 mean daily temperature 53°-58° F. the larvae returned to the surface and pupated just below soil level. The first imago emerged on April 27th. The return of larvae to the surface prior to pupation obviously facilitates emergence. It is pointed out that they are more susceptible to control measures at this period than at any other stage *after* leaving their host.

CAMBRIDGE UNIVERSITY.

PETHERBRIDGE (F. R.). **The Turnip Mud Beetles.** *Ann. App. Biol.*, vol. xv, No. 4, Nov., 1928.

Heloporus rugosus Ol. and *H. porculus* Bedel. have caused serious damage to late sown white turnips in several cases in the east of England during the last few years.

A case in which the growing points of white turnips (planted out for seed growing) were eaten out by the larvae is recorded.

Swedes and rape are damaged by these pests, but not to the same extent as white turnips.

Kale and Cabbages are only slightly damaged.

Lettuces were seriously damaged in Surrey in 1924.

One case of an attack on beans by H. rugosus was also noticed. Most of the damage is caused by the larvae which gnaw or tunnel into the "bulb" of the turnip as well as feeding on the developing leaves. The adults also feed on the leaves.

Eggs are probably laid in August and the larvae live from August until April or May.

Pupation takes place in April or May and pupae live about three weeks.

Adults were found from May until the following March.

Description of the larval, pupal and adult stages are given.

Late sowing and frequent cruciferous crops appear to predispose plants to attacks.

PETHERBRIDGE (F. R.) and TUNNINGTON (F.). **The Control of Apple Sawfly.** *Journ. Min. Agric.*, Feb., 1929.

This article shows how Apple Sawfly, hitherto uncontrollable, is readily controlled by soft soap and nicotine if the spraying is done at the correct time. In 1927 one spraying increased the crop by over 100 per cent., whereas in 1928 one spraying increased the crop by over 500 per cent. In this case the unsprayed trees were practically ruined by Sawfly.

HARPER ADAMS AGRICULTURAL COLLEGE, NEWPORT, SALOP.

EDWARDS (E. E.). **A Survey of the Insect and other Invertebrate Fauna of Permanent Pasture of certain soil types.** *Ann. App. Biol.*, vol. xvi, No. 2, May, 1929.

Samples of soils were taken from four distinct soil types of a permanent pasture, and one of arable land, and insects and other invertebrates found therein are recorded together with the approximate depth at which they occurred. An attempt was made to correlate the faunal data obtained in each area with the general environmental conditions. It was found that, while qualitative differences may exist between the fauna of the several areas, the main differences concern rather the proportions in which the various organisms occurred.

EDWARDS (E. E.). **On the morphology of Larva of *Dorcus parallelopipedus* L. (Coleoptera).** *Jour. Linn. Soc.*, 1929.

The paper is intended as a contribution towards a more complete understanding of the morphology of characteristic types of Coleopterous larvae.

A detailed technical description is given of the external morphology of the larva together with the salient features exhibited by the digestive and nervous systems.

UNIVERSITY COLLEGE OF SOUTH WALES, CARDIFF.

THOMPSON (H. W.). **The General Position with regard to Liver Fluke in South Wales.** *Welsh Journ. Agric.*, vol. 5, 1929.

This paper summarises the general observations made during the past 5 years with regard to the distribution of the water snails responsible for spreading the Liver Fluke, and discusses the general position with regard to the application of preventive and remedial measures in the area.

The effect on sheep buying and selling, and how the prevalence of this parasite in the area affects agricultural practice is discussed, and the importance of steps being taken to minimise the trouble is emphasised.

MANCHESTER UNIVERSITY.

MILES (H. W.). **Tar Distillates for Winter Spraying of Apples in North West England.** *Journ. Min. Agric.*, vol. xxxvi, No. 2, pp. 145–152.

Tar distillates have achieved a definite success in various parts of England as dormant sprays for fruit trees. Since the North-West, comprising the counties Lancashire and Cheshire, has an exceptionally heavy rainfall and is subject to severe late frosts, it was deemed advisable to test the value of some of the various brands of tar distillate washes under these conditions. Six washes which had proved successful elsewhere were used in trials at seven different centres in 1928 and were compared with washes containing di-nitro-ortho-cresol. All the washes proved eminently successful, yielding over 93 per cent. control of aphis, over 86 per cent. control of apple sucker, and a very definite control of Winter Moth and Tortrix Moth was also obtained.

MILES (H. W.). **A Review of the Present Position with Regard to Soil Insecticides.** *Journ. Bath and West. Soc.*, 6th Series, vol. iii, pp. 15–38.

The persistent losses caused by soil pests is tending to concentrate attention on the discovery and more extensive use of substances suitable as soil insecticides. Although no insecticide suitable for general application is available a number of chemical substances are in use for the control of soil pests. In this paper the author reviews these, describes the methods of employment and the results so far obtained in various parts of the world.

The insecticides dealt with include coal tar products such as Napthalene, Cresylic Acid, Creosote and Paradichlorbenzene; also Sodium Cyanide, Calcium Cyanide, Corrosive Sublimate, Carbon Bisulphide, Formaldehyde, Calcium Cyanamide, Copper Sulphate, Nicotine Sulphate, Potassium Xanthate, and Sulphur. The value of these substances in controlling wireworms, leatherjackets, cutworms, vegetable root flies, aphides, millipedes, centipedes, woodlice, slugs and eelworms is fully discussed.

MIDLAND AGRICULTURAL AND DAIRY COLLEGE, SUTTON BONINGTON, LOUGHBOROUGH.

ROEBUCK (A.). **Hemiptera in the East Midlands.** *Ent. Mon. Mag.*, May, 1929.

An account is given of the species of plant bugs which have appeared in the province. Many of these are faunistic records for the particular counties. *Dicranura mollicula* is strongly suspected of causing leaf loss of thyme in the Melbourne market gardening district of Derbyshire.

Plagiognathus arbustorum abundant on bush fruit is considered harmful. *Lygus pratensis* damages chrysanthemum buds. *Anthocoris sylvestris* feeds on aphis in the summer and apparently attacks Chrysanthemum buds later. *Piesma maculata*, associated with Crinkle in sugar beet on the Continent was found in Notts. on a field showing symptoms of this disease.

ROEBUCK (A). **Slugs, and how to kill them.** *B.B.C. Household Talks*, 1929.

Deals with the difficulties of the problem and the substances which have been used with success against slugs. Further deals with the use of common alum, lime and copper sulphate as solid dressings and as liquid sprays in gardens.

SEALE HAYNE AGRICULTURAL COLLEGE, NEWTON ABBOT, DEVON.

HODSON (W. E. H.). **The Bionomics of the Bulb Mite,** *Rhizoglyphus echinopus*, **Fumouze and Rogin.** *Bull. Ent. Res.*, xix, pt. 2, pp. 187–200, Oct., 1928. Abstract in *Rev. App. Entom.*, xvii, pt. 1, pp. 21–22, 1929.

HODSON (W. E. H.). **Some Notes on the Bulb Mite.** *Journ. Min. Agric.*, xxxv, No. 7, pp. 656–660, Oct., 1928. Abstract in *Rev. App. Entom.*, xvii, pt. 1, pp. 21–22, 1929.

HODSON (W. E. H.). **The Bionomics of** *Lema melanopa* **L. (Criocerinae) in Great Britain.** *Bull. Ent Res.*, xx, pt. 1, pp. 5–14, 2 pls., 15 refs, May, 1929. Abstract in *Rev. App. Entom.*, xvii, pt. 9, p. 502, 1929.

SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, KENT.

AUSTIN, M. D. **Pyrethrum Experiments, 1928.** *Journ. S. E. A. Coll.*, No. 26, pp. 124–135, July, 1929.

Details are given of experiments using alcoholic and aqueous extracts of pyrethrum side by side with nicotine, soft soap, etc., against various insect and allied pests; results discussed show that the alcoholic extract is superior to the aqueous and in some cases worthy of a trial in the place of N.S.S.

As an *Acaricide*, *scalicide* and against aphides the alcoholic extract met with great success, but against the larvae of Sawflies, Cabbage White Butterfly and others of comparatively large size it failed to control, thus verifying results obtained using the aqueous extract.

Method of preparing the solution is also given.

AUSTIN (M. D.). **Observations on the eggs of the Apple Capsid (*Plesiocoris rugicollis* Fall) and the Common Green Capsid (*Lygus pabulinus* Linn.).** *Journ. S.E.A. Coll.*, No. 26, pp. 136–144, July, 1929.

Variation in depth of egg-insertion of *Plesiocoris* through hardness of wood is suggested as influencing results obtained when using tar distillates as ovicides.

Methods are given used in the examination of certain varieties of apple (shoots, etc.), with eggs *in situ*, to examine critically the point mentioned,

and it was concluded that within the varieties examined hardness of wood seemed to have little influence on depth of egg-insertion and consequently could not be expected to influence results obtained with Tar Distillates.

Descriptions of the *ova* of *P. rugicollis* and *L. pabulinus* together with notes on their position and insertion in the host plants, are also given.

BRADE-BIRKS (S. GRAHAM). **Notes on Myriapoda XXXIII—The Economic Status of Diplopoda and Chilopoda and their Allies.** *Journ. S.E.A. Coll.* pt. 1, No. 26, pp. 178–216, July, 1929.

Deals with Symphyles, Pauropods and Centipedes. Symphyles are occasionally injurious. Pauropods are not known to cause damage and most Centipedes are either beneficial or not baneful; an exception is made in case of geophilomorphia, which are sometimes injurious, especially in the kitchen garden.

The author deals briefly with the literature of the subject and gives a long list of references. He gives an account of his own observations and experiments and deals in considerable detail with the diagnosis of British centipedes.

BRADE-BIRKS, (S. GRAHAM). Articles: "**Centipede,**" "**Millipede,**" "**Myriapoda,**" "**Pauropoda,**" "**Symphyla.**" *Encycl. Brit.*, 14*th edition*, 1929.

These articles give a general account of the zoology of the animals mentioned.

THEOBALD (the late F. V.). **Tar Distillate Trials in Kent and West Sussex.** *Journ. Pom.* vii, No. 3, pp. 199–211, Dec., 1928.

A record of trials carried out with various commercial tar distillates, mainly in connection with capsid bug control in apples and currants at Sompting Manor, near Worthing, and at South Street, near Selling, Kent. Counts of leaf damage caused by Capsids on apples and also the weights of clean and damaged fruit are recorded. One case at Sompting, an unsprayed row, gave 14 lb. of saleable fruit, 19 lb. capsid damaged; the next row, sprayed with Mortegg gave 128½ lb. saleable and 161½ lb. damaged; an Abolene sprayed row 190 lb. saleable and 69 lb. damaged. The results of tar distillates for Currant Capsid were negligible. Other experiments deal with the effect of tar distillates on Aphides, Psylla and other insects. Complete control was obtained with Aphides and Psylla and partial control with Winter Moth and other insects. Trials with tar distillates on nuts are also recorded, the object being to find out the safe time to spray the nut plantations, viz. January.

THEOBALD (the late F. V.). **The Plant Lice or Aphididae of Great Britain,** vol. iii, pp. 364, vi & 213 figures. (Headley Bros., Ashford and London.) 30s.

This volume completes the Monograph of British Aphides or Plant Lice. It deals with the structural character, life-cycles and the distribution, both British and foreign, of all the members of the sub-tribe *Chaitophorina*, the tribe *Lachnini*, the sub-family *Eriosomatinae*, including the tribes *Fordini Aploneurini*, *Prociphilini*, the sub-family *Hormaphidinae*, including the *Cerataphidini* and *Hormaphidini*, also the sub-family *Mindarinae*. There is an appendix dealing with new matter since the appearance of Volumes I and II, and a note by Rymer Roberts on the life-cycle of *Periphyllus testudinatus* and *P. aceris*. The work is fully indexed and illustrated with woodcuts and photographs.

THEOBALD (the late F. V.). **The Apple Leaf Skeletoniser** (*Hemerophila pariana* **Clerck.**). *Bull.* 7, *S.E.A. Coll.* (Adv. and Res. Dept.), Oct. 1928.

Gives a full account of all stages of this apple tree pest, its distribution, damage done to foliage and fruit; methods of dispersal and treatment. Especial reference is made to a severe attack of it in Kent, where 100 acres on one farm had the apples practically defoliated.

THEOBALD (the late F. V.). **Some Notes on Injurious Insects and other Animals in 1928.** *Journ. S.E.A. Coll., No.* 26, pp. 104–116, July, 1929.

An account of the various insect pests that occurred in the S.E. province for the year. Notice is made of a new strawberry pest—a sawfly (*Cladius pecticornis*—Four), and a new enemy of mushrooms—a midge—(*Sciara annulata*—Meigen) with figures of the midge, larva and pupa. An illustrated account is given of the Golden-Y Moth (*Plusia moneta*) which severely attacked delphiniums in Kent. There is a record of experiments carried out on the control of slugs in fields, hop gardens and private gardens. The best results obtained were with copper sulphate at the rate of 4 lbs. mixed with 2 cwt. of fine lime per acre broadcast on wheat, the copper sulphate being well crushed beforehand. Garden experiments showed that powdered copper sulphate broadcast was better than a wet spray of the same. On hop shoots the copper sulphate had a scorching effect. Paris green and bran bait was tried in the field but was not successful; on the other hand, put on thickly round hops and in gardens it proved very successful. Napthalene at 4 oz. to the square yard in gardens controlled the small black slug, but could not be used in sufficient quantity in field cultivation to do any noticeable good.

This report also contains further notes on the prevalence of the destructive American grey Squirrel in various parts of the country.

THEOBALD (the late F. V.). **A Simple Diagnosis of the Plant Lice of Ribes and Apple.** *Journ. S.E.A. Coll., No.* 26, pp. 117–123, July, 1929.

A diagnostic account of the various plant lice or aphides found on ribes and apples, with synoptic tables, simple life-history notes, etc., illustrated by a coloured plate of all the species found on those plants.

THEOBALD (the late F. V.). **Some Aphides from the Italian Somaliland and Eritrea.** *Bull. Ent. Res.*, xix, pp. 177–1010.

Contains the description of a new genus and species *Paoliella hystrix* found in *Commiphora savojae* and a new species of *Geoica—G. pseudosetulosa* on the roots of maize (*Zea mais*); also notes on the other species found in that part of Africa.

THEOBALD (the late F. V.). **Notes on** *Tetraneura hirsuta* **Baker.** *Entomologist,* lxi, p. 300, 1928.

The distribution of the root feeding aphid is traced to Africa, Southern India, Japan and the Phillippine Islands, and since found in Asiatic Russia. The apterae feed on the roots of barley, rice, Kikuyu grass, *Panicum novemnerve*, *Cynodon dactylon* and *Digitaria milanjiana*. The winged female is described for the first time.

THEOBALD (the late F. V.). **A New Aphis from Bermuda (p. 51) in Mr. Ogilvie's "Insects of Bermuda"** (1929).

Description of a new aphis found by Mr. Ogilvie during his virus disease experiments of the Bermuda Lily.

THEOBALD (the late F. V.). **Some Aphides from Southern India with descriptions of six new species.** *The Entomologist, lxii, No.* 795, pp. 177–181, August, 1929, and No. 796, pp. 196–201. (Sept., 1929.)

A report on a collection sent by the Department of Agriculture of Mysore including a description of six new species: *Macrosiphum eleusinae, Longicandus hamelii, Hyalopterus carrii, Aphis tridacis, Aphis bidentis, Aphis achyranthi* and an *Oregma O. mysorensis* on bamboos.

NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.

MORISON (GUY D.). **The Muscles of the Honey Bee** (*Apis mellifera* **L.**) **Part III. The Healthy Muscles of the Adult Honey Bee. The Chemistry of the Muscles.** *Quart. Journ. Micr. Sci.*, 72 pp. 511–526. (Dec. 1928.)

The chemistry of the muscle is described in outline. With it are included pH values and pigment. The appearance of muscle under polarized light is discussed. The effects of age and fatigue on muscle could not be determined by the techniques adopted. The theories of muscular contraction are summarized briefly.

MORISON (GUY D.). **Observations and Records for some Thysanoptera from Great Britain. IV.** *Amblythrips ericae* **(Hal.).** *Ent. Mon. Mag.*, 65, pp. 22–28, Jan., 1929.

The name *Amblythrips* is discussed and the egg, the female and male prepupae and pupae are described. The species is often very abundant on heathers, *Calluna vulgaris, Erica cinerea, E. Tetralix* on which it feeds and breeds. The life-history in N.E. Scotland is described. Both females and nymphs hibernate. The winter nymphs are darker and broader than summer nymphs and they seem unique amongst *Thripidae* in showing well-marked sexual distinction.

MORISON (GUY D.). **Observations, etc. V. Physothrips spp.** *Ibid.* pp. 113–127.

The hitherto unknown life-histories and the immature instars of *Physothrips vulgatissimus* (Hal.), *P. atratus* (Hal.) and *P. latus* Bagn. (including *propinquus* Bagn.) are described as they occur in the N.E. of Scotland where the three species of thrips are very common. The life cycle of each species is intimately connected with the leaf cycle of various annual or deciduous plants. In each species there are two generations during the year and apparently only females survive the winter. The two generations of males appear only during June-October.

(J) MYCOLOGY AND VIRUS DISEASES.

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

SAMPSON (KATHLEEN). **The Biology of Oat Smuts. I. Viability of the Chlamydospores.** *Ann. App. Biol.*, vol. xv., No. 4, p. 586, Nov., 1928.

Samples of chlamydospores of *U. avenae* and *U. levis*, dating in some cases back to 1921, have been tested on various media including 2 per cent. cane sugar solution and extract of the pales of oats. The results are expressed graphically and in tabular form.

The influence on viability of different methods of collecting and storing the spores was investigated and it was shown that the longevity of a sample is closely linked with its state of maturity. Certain differences were noted between the viability of spores in the two species which appear to be of significance in connection with their different methods of contamination and infection.

SAMPSON (KATHLEEN). **The Biology of Oat Smuts. II. Varietal resistance.** *Ann. App. Biol.*, vol., xvi, No. 1, p. 65, Feb., 1929.

This paper deals with the infection capacities of a number of collections of spores of *U. levis* and *U. avenae*. Seven biological species have been distinguished by their behaviour on selected varieties of the species *Avena sativa A. nuda* and *A. strigosa*. Pure line selections of *A. strigosa* varied in susceptibility to a particular biological species of *U. levis* from 0 to 100 per cent. The different methods of testing varieties of oats for resistance to smut have been studied.

In British commercial samples the attack of smut (*U. avenae*) was heaviest on varieties of the winter potato and spring groups.

LONG ASHTON FRUIT RESEARCH STATION.

HUTCHINSON (H. P.) and NATTRASS (R. M.). **"Black Canker" of the Basket Willow.** *Journ. Min. Agric.*, July, 1929.

"Black Canker" is caused by *Physalospora miyabeana*. This parasitic fungus attacks the willow plant at all stages of its growth, forming lesions on the stems. The fungus and means by which the disease is spread are described. The susceptibilities to attack of the chief varieties of basket willows and the conditions favourable and unfavourable to development of the fungus are noted.

Preventive measures of control are advised.

MARSH (R. W.). **Report on Bunt Prevention Trials, 1928.** *Ann. Rep. Agric. and Hort. Res. Sta., Long Ashton*, 1928.

Little Joss wheat seed artificially contaminated with bunt (*Tilletia caries*) was treated with (1) 2·5 per cent. copper sulphate solution, (2) 1 in 320 formalin solution, (3) copper carbonate powder 2 oz. per bushel or (4) left untreated. The seed was planted at Long Ashton in late October, 1927, each treatment except that with formalin being represented on two plots. Growth of the wheat was not adversely affected by any of the fungicidal seed dressings. Counts made on the plots in August, 1928, gave the following percentages of bunted heads: (1) copper sulphate treatment—0·03 and 0, (2) formalin

treatment—0·15, (3) copper carbonate treatment—0·1 and 0, (4) control, seed not dressed—27·01 and 23·65.

MARSH (R.W.). **Investigations on the Fungicidal Action of Sulphur. III. Studies on the Toxicity of Sulphuretted Hydrogen and on the Interaction of Sulphur with Fungi.** *Journ. Pom. and Hort. Sci.*, vol. vii, 1929. Also in abridged form, in *Ann. Rep. Agric. and Hort. Res. Sta., Long Ashton*, 1928.

Quantitative tests of the toxicity of sulphuretted hydrogen showed that H_2S at a concentration of 1 in 40,000 strongly reduced the germination of spores of *Botrytis cinerea, Monilia fructigena* and *Monilia cinerea*. In 1 in 8,000 H_2S, no germination of spores of *Penicillium sp.* or *Physalospora miyabeana* took place, and 1 in 4,000 H_2S would not permit of germination of spores of *Fusicladium dendriticum* and *Cladosporium herbarum*. Indications were obtained that strengths of H_2S toxic to fungi could be tolerated by a flowering plant.

Spores kept under the influence of the gases evolved from the sulphured living leaves of strawberry and other plants have shown marked inhibition of germination. The same effect was obtained by confining spores over a sulphured fungus fructification. In these experiments H_2S was produced from the sulphured surfaces in quantities sufficient to account for the inhibiting effect. A mixture of spores of *Monila fructigena* with sulphur in water was also found to evolve H_2S, while mixtures of *Botrytis cinerea* and sulphur did not. It is suggested that the "sensitiveness" of certain spores to sulphur is an indication of the ability of such spores on germination to interact with sulphur with the production of H_2S. The paper concludes with a bibliography of 17 titles.

MARSH (R. W.) and MAYNARD (J. G.). **A Preliminary Note on the Control of Black Currant Leaf Spot** (*Pseudopeziza ribis*). *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton*, 1928. Also in *Journ. Bath and West Soc.*, Series 6, vol. iii, 1928–29.

Control of black currant leaf spot cannot be obtained by spraying in the spring; and spraying during May and June is impracticable because of marking the fruit. An experiment with a spray applied after cropping was carried out at Long Ashton in July, 1928. Approximately 3,000 bushes of Baldwin were sprayed immediately after picking with either 2–4–50 or 4–4–50 Bordeaux, 186 bushes being left as control. The unsprayed bushes lost half their leaves by the end of August and the remainder during September as a result of the attacks of the fungus, while all the sprayed bushes retained their foliage until the normal time of leaf fall in October–November. The increase in vigour of the sprayed bushes, consequent on the prevention of premature defoliation, was reflected in the fact that, in November, buds from the sprayed plots averaged 15·3 per cent. heavier than those from the unsprayed. Photographs illustrating the effect of the spray treatment are given.

MAYNARD (J. G.) and MARSH (R. W.). **Spraying Trials against Apple Scab at Long Ashton in 1928.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton*, 1928. Also in *Journ. Bath and West Soc.*, series 6, vol. iii, 1928–29.

Spraying trials against Apple Scab at Long Ashton in 1928 were designed particularly to obtain information relating to spray damage and to the costs of spraying. The trials were carried out on a total of approximately 900 trees (6 acres) planted 1918–20. The varieties are noted below.

Two pre-blossom sprays with 8–16–100 Bordeaux were applied on April 2–7 and April 13–16 respectively. The weather during this period was marked by cold drying winds. A power sprayer and guns were used, giving a drenching spray of 200 lb. pressure. Some scorching resulted, particularly on Bramleys, but the damage was only transitory.

A single post-blossom spray was given at various dates between May 31 and June 11: the application being with guns as before. Trees of the varieties Lane, Worcester, Bramley, Cox, Allington and Edward were given a post-blossom spray with 4–10–100 Bordeaux: other trees of Lane, Worcester, Bramley, Cox, Edward, Allington, Grieve and Stirling received colloidal sulphur 10–100. Following the Bordeaux spray, Cox and Edward showed very heavy defoliation and Lane exhibited defoliation and almost complete loss of crop.

The percentage of scab-free fruit on all the sprayed plots varied between 94 and 100, averaging over 99. This favourable result is attributed to the early and heavy pre-blossom application of Bordeaux at an adequate pressure. An unsprayed row of Lane showed 40 per cent of scabbed fruit.

A chart of the meteorological data from April to June and a detailed statement of spraying costs are appended. It is shown that the cost of material is, in general, about one-third of the total cost of spraying against apple scab.

PLANT BREEDING INSTITUTE, CAMBRIDGE.

Salaman (R. N.). **Contributions to a Discussion on Ultra-Microscopic Viruses infecting Animals and Plants.** *Proc. Roy. Soc.*, B. vol. 104, 1929.

An account was given of the discovery of a new form of crinkle whose reactions are very distinct, though clinically resembling the crinkle originally described by Murphy. Evidence was given shewing the importance of varietal reaction which may be sufficient to produce the appearance in different varieties of different diseases from the same virus.

Smith (Kenneth M.). **Studies on Potato Virus Diseases. No. V.—Insect Transmission of Potato Leaf-roll.** *Ann. App. Biol.*, xvi, 2, May, 1929.

This work shows that one particular insect, a certain species of aphis, *M. persicae*, is an efficient carrier of the leaf-roll virus. Other potato-feeding insects have failed to carry leaf-roll. The virus is not hereditary by the progeny of infective parents. It has been found that feeding infective aphides upon immune plants such as cabbage does not affect the subsequent infective power of such aphides.

Smith (Kenneth M.). **Studies on Potato Virus Diseases. No. VI.—Further experiments with the virus of a potato mosaic upon the tobacco plant.** *Ann. App. Biol.*, xvi, 3, Aug., 1929.

The virus of potato mosaic upon tobacco is shown to increase in virulence by progressive needle inoculation. An analysis is given of comparative needle and aphis inoculation of potato mosaic into tobacco ; the symptoms produced by the aphis differ from those produced by the needle and are constant in character.

Smith (Kenneth M.). **Contributions to a Discussion on "Ultra-microscopic Viruses Infecting Animals and Plants."** *Proc. Roy. Soc.*, B. 104, 1929.

An account was given of the formation of ringspot in tobacco by means of the virus of potato mosaic and of the production of four distinct modifications of one virus by certain manipulation.

HORTICULTURAL RESEARCH STATION, EAST MALLING.

WORMALD (H.). **Bacterial Diseases of Stone-Fruit Trees in Britain. I.—Preliminary Note on Bacteriosis in Plum and Cherry Trees.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928. II Supplement, 121–127.

Descriptions are given of certain bacterial diseases of plum and cherry trees in this country. Experiments have shown that bacteria may cause:— 1. Shoot Wilt of plum trees. 2. Gummosis and Leaf Spot in cherry trees. 3. Bacterial Canker in plum and cherry trees.

The relation between the so-called "Die-back" of stone-fruit trees, and the disease here described as "Bacterial Canker" is briefly discussed.

WORMALD (H.). **The Present Distribution of the Brown Rot Fungi: Its Economic Significance.** *Journ. Min. Agric.*, Nov., 1928, **35**, 741–750.

1. The chief fruit-rotting fungus of Britain and the Continent of Europe (*Sclerotinia fructigena*) has not been found in Australia, New Zealand and North America.

2. The Blossom Wilt fungus of plums and cherries (*S. cinerea* forma *pruni*), also common in Europe, is found in the Pacific coastal regions of North America but not in Australia or New Zealand.

3. The Blossom Wilt fungus of apples (*S. cinerea* forma *mali*) appears to be confined to Europe.

4. The Brown Rot fungus prevailing in North America, Australia, and New Zealand (*S. americana*) is not at present found on fruit trees in this country, but it has been found recently on peaches imported from America.

5. The possibility and consequences of introducing any one of these fungi into a region where it is not found at present are discussed.

WORMALD (H.). **On the Cause of "Die-back" in Plum Trees.** *Gard. Chron.*, Nov., 1928, **84**, 372–373.

The symptoms of this disease, as shown by trees on the trial plots at the East Malling Research Station, are stunted growth and yellowish foliage, followed by the death of the tree or branches. These symptoms are accompanied by bacterial lesions on the stems or branches. An organism isolated from such lesions proved by inoculation experiments to be pathogenic. The name Bacterial Canker is proposed for this type of "die-back."

There is evidence that the same organism causes a spotting and "shot-holes" in the leaves.

WORMALD (H.). **Some Diseases of Fruit Trees.** *Essex F.U.Y.B.*, 1929, 279–293, and *East Malling Res. Sta. Ann. Rep. for* 1928, Apr., 1929, I.—General.

In this article those methods are reviewed which recent advances in our knowledge of plant protection have shown to be most likely to give good results against the more destructive fungous, bacterial and virus diseases of fruit trees in Britain.

WORMALD (H.). **Notes on Plant Diseases in 1926.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 75–88.

The chief features noted are the prevalence of Grey Mould (*Botrytis cinerea*) on various hosts, and the damage caused by Blossom Wilts (*Sclerotinia cinerea*) particularly on Morello cherries. Brown Rot of apples (caused by *Sclerotinia fructigena*) was common about picking time, particularly on those James Grieve apples which had been picked from the stalks instead of with the stalks, the rot starting at the stalk end.

WORMALD (H.). **Notes on Plant Diseases in 1927.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 111–118.

Of the diseases mentioned in these "Notes" the most notable were the damage caused by frosts in spring, the Sooty Blotch of apples which was unusually prevalent in 1927, and the severe infection of hops by Downy Mildew.

WORMALD (H.). **Further Studies of the Brown Rot Fungi. III.—Nomenclature of the American Brown-Rot Fungi: a Review of Literature and Critical Remarks.** *Trans. Brit. Mycol. Soc.*, Oct., 1928, **13**, 194–204.

A survey is presented of the literature on the nomenclature of the brown-rot fungus generally distributed throughout the fruit-growing regions of the United States and Canada. The names that have been applied to it are: *Sclerotinia fructigena* (Pers.) Schröt.; *Sclerotinia cinerea* (Bon.) Schröt.; *Sclerotinia cinerea* forma *americana* Wormald; *Sclerotinia americana* (Wormald) Norton & Ezekiel; *Sclerotinia fructicola* (Winter) Rehm.

The main theme of the present paper is to show that descriptions of Winter's *S. fructicola* do not differentiate between *S. cinerea* and Norton & Ezekiel's *S. americana*, both of which are found in North America.

WORMALD (H.) AND FRAMPTON (A. M.). **Note on "Black Rot" of Cruciferous Plants.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 108–110.

In October, 1925, seedling plants of broccoli and savoy on the Station showed symptoms similar to those described for Black Rot, a disease of cruciferous plants which is common in America.

From diseased leaves an organism was isolated which was found to correspond to *Pseudomonas campestris*, the bacterium which causes Black Rot. A brief description of symptoms and suggestions for control are given.

FRAMPTON (A. M.). **Preliminary Report on the Incidence and Control of Apple Scab and Apple Mildew.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 96–107.

This is a report on one year's work, in 1926, in connection with spraying trials that are being carried out at East Malling Research Station, on trees of the varieties Cox's Orange Pippin and Stirling Castle. The chief results recorded are:—

On Cox's Orange Pippin scab was controlled on the foliage for seven weeks by a pre-blossoming application of either lime-sulphur 1 : 29, or Bordeaux Mixture 8–8–100. A further application after blossoming of lime-sulphur 1 : 100 or of Bordeaux Mixture 8–25–100 proved similarly fungicidal. The post-blossoming application of both lime-sulphur and Bordeaux Mixture caused considerable dropping of the older leaves.

On Stirling Castle, post-blossoming application of sulphur-containing sprays caused some defoliation.

HARRIS (R. V.). **The Pathology of the Raspberry: a Summary of Results of Recent Research at East Malling.** *East Malling Res. Sta. Ann. Rep.* 1926–27, Oct., 1928, II—Supplement, 128–134.

This article is a summary of the results of three years' work on four diseases of the raspberry, viz:—1. Blue Stripe Wilt (*Verticillium Dahliae*). 2. Cane Spot (*Plectodiscella veneta*). 3. Mosaic. 4. Spur Blight (*Didymella applanata*).

The symptoms, cause, and suggested methods for control are given for each disease.

JOHN INNES HORTICULTURAL INSTITUTION.

CAYLEY (D. M.). **"Breaking" in Tulips.** *Ann. App. Biol.*, xv, 4, 1928, pp. 529–539.

"Breaking" in Tulips is infectious and can be induced by bringing the internal tissues of a normal bulb in contact with tissue from a "broken" bulb during the resting period. The degree of "breaking" appears to be proportional to the amount of infected tissue introduced.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

BRIERLEY (W. B.), JEWSON (S. T.) and BRIERLEY (M. F.). **The Quantitative Study of Soil Fungi.** *Proc. and Papers 1st Intern, Cong. Soil Sci.*, June, 1927, vol. iii, pp. 1–24.

The technique of quantitative estimation is analysed into constituent factors as follows—A. Factors of sampling—methods; amount; depth distribution; storage; comparison. B. Factors of suspension—sampling of sample; shape of container; suspension liquid; standing of suspension. C. Factors of disintegration—method; violence and duration of shaking. D. Factors of dilution—method; degree. E. Factors of plating—method; number and size of plates; amount, composition and acidity of medium; competition. F. Factors of incubation—period; temperature. G. Factors of counting—method. These factors are investigated singly and in combination and a standard technique suggested.

BRISTOL-ROACH (B. M.). **The Present Position of our Knowledge of the Distribution and Function of Algae in the Soil.** *Proc. and Papers 1st Intern. Cong. Soil Sci.*, June, 1927, vol. iii, pp. 1–9.

In considering the possible role of algae in the soil one must recognise the extreme variability of the physiological reactions of the different species to conditions imposed by the carbon and nitrogen cycles. It appears to be unjustifiable to regard the soil algae as a homogeneous physiological unit, and research is needed on the relation of the algae to the activities of bacteria and fungi in soil. The chief importance of the algae may lie in their ability under suitable conditions of light and moisture to add considerable quantities of organic matter to the soil.

MARTIN (M. S.). **Additional Hosts of** *Synchytrium endobioticum* **(Schilb.) Perc.** *Ann. App. Biol.*, xvi, 3, 1929, Aug., pp. 422–429, 2 plates.

Infection of numerous species of Solanaceae by *Synchytrium endobioticum* has been obtained using Glynne's "green wart" method. Plants grown in contaminated soil did not show infection. The following new hosts are recorded: *Solanum dulcamara* var. *villosissimum*, *Nicandra physalodes*, *Solanum dulcamara* alba, *Solanum nodiflorum* and *Solanum villosum*. In certain hosts the fungus may occur in the tissues with little or no external sign of its presence.

SMITH (J. HENDERSON). **The Transmission of Potato Mosaic to Tomato.** *Ann. App. Biol.*, xv, 4, 1928. Nov., pp. 517–528, 3 plates.

Inoculation with the foliage of normal potatoes produced no disease in tomato, but inoculation with foliage of mosaic potatoes produced a characteristic disease transmissible back again to potato. The virus is filterable and will stand high dilution and ageing for several months; but is less resistant than tobacco mosaic to heat or alcohol. It is probable that there exist several strains, differing in resistance, of the virus causing mosaic in potato. The disease produced in tomato or tobacco by potato mosaic closely resembles that obtained by Johnson on inoculation of supposedly healthy potato foliage.

EXPERIMENTAL AND RESEARCH STATION, CHESHUNT, HERTS.

SMALL (T.). **A Disease of the Strawberry Plant.** *Journ. Pom. and Hort. Sci.*, vii, 3, 212–215, 1928.

Diplodina lycopersici (Cooke) Hollos emend. Brooks and Searle, has been found causing a disease of strawberry plants growing under glass and in the open. All parts of the plant, except the crown, are susceptible to attack, but usually the disease appears at the base of the leaf petioles causing blackening and collapse of the tissues. Experiments suggested that the disease originates through contact with infected soil, and that direct infection of aerial parts by spores is improbable. Spores overwintered in pycnidia on diseased tissue and in the soil. Wet conditions around the base of the plant and a temperature about 15° C. appeared to favour the disease. Control methods suggested include soil sterilisation by heat; use of clean stocks; destruction of diseased tissue, and the avoidance of deep planting and excessive moisture round the base of the plant.

WHITE (H. L.). **The Wilt Disease of the Carnation.** *Journ. Pom. and Hort. Sci.*, vol. viii, No. 4, 1929, pp. 302–323.

Wilt disease of the carnation in England is caused mainly by *Fusarium culmorum*, *F. acuminatum*, *F. anthophilum* and *F. herbarum*. *F. culmorum* from the carnation may attack the potato, aster and tomato. *F. sporotrichoides* associated with carnation bud rot can also cause wilt disease. Sources of infection in nurseries are mainly contaminated water and soil. Infection mainly occurs through a wound. The period of maximum wilt occurs at times of high temperature from April to August. High soil temperatures and an excess of moisture encourage rapid development of the disease. Control measures include the use of clean cuttings, a clean water supply, avoidance of high temperatures, disinfection of the houses and sterilisation of the beds by steam.

MINISTRY OF AGRICULTURE AND FISHERIES, PATHOLOGICAL LABORATORY.

PETHYBRIDGE (G. H.) **A New Disease of the Dahlia.** *Gard. Chron.*, 84, 1928, pp. 393–4.

A brief account is given of the symptoms and life-history of *Entyloma Dahliae*, the causal organism of a leaf disease of dahlias, the presence of which was first recorded in England in Surrey during 1927. It was found again the following year on specimens submitted from Berkshire and Glamorgan.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

KIDD (M. N.). **Apple-rot Fungi in the Overseas Transport and Marketing of New Zealand Apples.** *N.Z. Journ. Sci. Tech.*, 1929, 11, 30.

An analysis of the fungal wastage occurring in three varieties of New Zealand apples after arrival in this country. Particular interest is attached to the presence of certain fungi not hitherto recorded as occurring in New Zealand, for example, *Diaporthe perniciosa* and *Fusarium fructiginum*.

DEPARTMENT OF AGRICULTURE FOR SCOTLAND, PLANT PATHOLOGY LABORATORY.

ALCOCK (N. L.) **Seed of** *Trifolium repens* **L. carrying a fungus resembling** *Sclerotinia Trifoliorum*, **Clover Stem Rot.** *Extrait de Comp. rend de l'Assoc. Intern. d'Essais de Semences.* No. 6, 1928 (Copenhague V.).

ALCOCK (N. L.). **Bean Pod Canker or Bean Anthracnose** (*Colletotrichum lindemuthianum*). *Gard. Chron.*, 13th October, 1928.

ALCOCK (N. L.) *Keithia Thujina* **Durand—a Disease of Nursery Seedlings of** *Thuja plicata*. *Scott. For. Journ.*, 42, pt., pp. 77–79, 1928.

ALCOCK (N. L.). **A Root Disease of the Strawberry.** *Gard. Chron.*, 6th July, 1929.

A fungus of the Phytophthora genus found to be present in strawberries affected by the Lanarkshire disease. This Phytophthora fungus is put forward as the cause.

ALCOCK (N. L.) and BRAID (K. W.). **The Control of Bracken.** *Scott. For. Journ.*, 42, pt. 2, pp. 68–73, 1928.

FOISTER (C. E.). **A White Tip Disease of Leeks.** *Gard. Chron.*, 9th Feb., 1929.

A short description is given of the symptoms of this disease, its occurrence and importance. A brief synopsis of the characters of the causal fungus is also given.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

MUSKETT (A. E.). **The Control of Ordinary or Late Blight of the Potato in Northern Ireland.** *Journ. Min. Agric., N. Ireland*, vol. ii, 1929.

Experiments dealing with the control of potato blight by spraying and by dusting have been carried out over a period of four years. None of the

dusting powders used in these experiments gave such good results as those obtained by spraying the crop with Burgundy mixture.

The copper dusts used did give some control over potato blight, but at present they cannot be recommended in preference to spraying with a recognised mixture.

MUSKETT (A. E.) and TURNER (E.). **Apple Scab and its Control in Northern Ireland. Part I.** *Journ. Min. Agric., N. Ireland,* vol. ii, 1929.

Apple scab has caused, and is causing, much damage to the apple crop in Northern Ireland, particularly with regard to the variety Bramley Seedling, which is largely grown in County Armagh. The main source of infection from year to year lies in the production of perithecia in fallen leaves. Spraying in February with tar oil winter washes is of no value in controlling apple scab. Satisfactory control has been obtained by spraying three times in summer (pinking, petal fall, and post petal fall) with an excess lime Bordeaux mixture (2¼—8–40). A large increase in the quantity of fruit produced as well as great improvement in quality has been obtained, and in this connection the early application of the spray (pre-pinking and pinking) is of great importance. Lime sulphur has not given such good results as Bordeaux mixture and although Burgundy mixture (2–2½—40) has been used with success as a fungicide, it has caused slight scorching in some seasons, a feature which at present prohibits its general recommendation. It has been shown that one spraying only is almost useless and that the carrying out of a regular spraying programme each season is necessary. Over a period of four years the extra money value of the crop produced by a hundred sprayed trees as against that produced by a hundred unsprayed trees was £200.

UNIVERSITY COLLEGE OF NORTH WALES, BANGOR.

WHITEHEAD (T.) and JONES (W. A. P.). **"Dry Rot" of Swedes.** *Welsh Journ. Agric.*, vol. v, 1929.

Discusses the agricultural aspects of the disease, the relative importance of seed infection and manure contamination, susceptibility of varieties under trial since 1922, and various attempts to find a measure of control.

WHITEHEAD (T.) and CURRIE (J. F.). **A Preliminary Note on the Development of Secondary Symptoms of Potato Leaf-Roll in the Year of Infection.** *Scott. Journ. Agric.*, vol. xii, No. 2, 1929.

Briefly describes experiments showing that a definite stage exists in the growth of a potato plant up to which secondary symptoms of leaf-roll will show in the same year, and beyond which the progeny must be grown to prove that infection has occurred.

CAMBRIDGE UNIVERSITY.

PETHERBRIDGE (F. R.) and DILLON WESTON (W. A. R.). **Observations on the Spread of Apple Mildew Fungus,** *Podosophaera leucotricha. Trans. Brit. Mycol. Soc.*, vol. xiv, pts. I and II, Mar., 1929.

Statements in the paper by Woodward (*Trans. Brit. Mycol. Soc.*, xii, 1927, pp. 195–196) are criticised and evidence is produced by the writers to show that in the varieties Chivers Seedling and Bramleys Seedling

"secondary infection" may be an important factor in the spread of this disease; other observations in fruit plantations support the view that this is true of certain other varieties.

PETHERBRIDGE (F. R.), DILLON WESTON (W. A. R.) and KENT (W. G.). **Successful Control of Apple Scab in the Wisbech Area.** *Journ. Min. Agric.*, Apl., 1929.

(1) Spraying experiments for two years on the same Worcester Pearmain trees at Wisbech show an average profit of nearly £50 per acre per annum with home-made excess-lime-Bordeaux mixture and with half-strength excess-lime-Bordeaux mixture.

(2) Lime sulphur gave an average profit to about £37 10s. per annum.

(3) The cost of spraying was about £4 per acre in 1927 and about £6 in 1928.

(4) The control plots show a loss.

(5) The figures explain why many Worcester Pearmains in the Wisbech district are unprofitable after a certain age.

(6) Tar-oil spraying alone was of very little value.

DILLON WESTON (W. A. R.). **The Effect of *Tilletia caries* (D.C.) Tul. (=*T. tritici*) (Bjerk) (Wint.) on the Development of the Wheat Ear.** *Phytopath.* 1929, vol., xix, No. 7.

The purpose of this note is to show the true nature of the suppression of awns in bunted wheat ear.

DILLON WESTON (W. A. R.). **Observations on the Bacterial and Fungal Flora of the Upper Air.** *Trans. Brit. Mycol. Soc.*, vol. xiv, Pts. I and II, March, 1929.

The results show the ubiquitous nature of fungal spores and bacteria in the upper air, and that a large number of these are viable even at an altitude of two miles above the earth. From the flights made it would seem that in the summer (as one would expect) the air is very much more heavily charged with fungal spores and bacteria than in the winter months. The trend of the work suggests that the air is the ideal medium for the transportation of microscopic organisms and suggests that epidemics of plant and animal diseases may be brought about in this manner. Some evidence has also been obtained that the clouds are more heavily charged with fungal spores and bacteria than the air a little below them.

DILLON WESTON (W. A. R.). **The Control of Bunt in Wheat.** *Ann. App. Biol.*, vol. xvi, No. 1, Feb., 1929.

(1) Results of control experiments over a period of four years are given. The wet treatments, with formaldehyde and copper sulphate, are compared with the dry treatment, using copper carbonate.

(2) The dusting method is discussed. It is shown that infection varies with the spore load and that the efficiency of the dusting treatment is proportional to the rate of contamination. For the usually slightly contaminated seed samples this treatment has been effective in controlling bunt.

(3) The practical aspect of dusting wheat is discussed and its cost compared with the other treatments.

(4) A report is given of the feeding of dressed wheat to poultry.

SCHOOL OF BOTANY, CAMBRIDGE.

BROOKS (F. T.) and BRENCHLEY (G. H.). **Injection experiments on Plum Trees in relation to** *Stereum purpureum* **and Silver-leaf Disease.** *New Phytologist*, July, 1929.

(1) Silvering of the foliage and other pathological symptoms, such as browning of the flowers and leaf-tips, are induced in plum trees by injecting their stems with a filtered, non-living extract of *Stereum purpureum* in the culture fluid in which the fungus has grown.

(2) The same effects are produced by using for injection only the culture fluid in which the fungus has grown for some time.

(3) Boiling of these fluids for five minutes before using them for injection inhibits silvering of the foliage but does not prevent the fulfilment of other pathological symptoms.

(4) These fluids, whether boiled or unboiled before injection, induce an extensive brown discoloration of the wood in the vicinity of the injection holes owing to the formation of gum-like substances. This effect on the wood is similar to that caused by the growth of *Stereum purpureum* in it.

LEEDS UNIVERSITY.

BURR (S.). **Sprain or Internal Rust Spot of Potato.** *Ann. App. Biol.*, vol. xv., No. 4, pp. 563–585, Nov., 1928.

This disease occurs in a virulent form in certain sandy soils in Yorkshire which are very deficient in organic matter. The histological structure of the lesions both in the cortical and medullary tissues of the potato are fully described and illustrated. Infection of the crop arises mainly from the soil and not from the mother tuber. The disease develops rapidly and continuously in storage. An organism has been isolated from the lesions which by soil inoculation reproduces the disease. It has been named *Bacterium rubefaciens* and is cultured artificially with great difficulty. A second disease called "Corky Bacteriosis" of the xylem is sometimes associated with sprain and is caused by an organism which has been named *Bacterium suberfaciens*.

BURR (S.). **Sprain or Internal Rust Spot of Potato.** *Univ. of Leeds and Yorkshire Council for Agric. Educ. Report* 160, March, 1929.

An account is given of field trials for the control of the disease and for the resistance to it of a number of potato varieties. Highly satisfactory control of the disease was afforded by green-manuring and some practical suggestions are made as to the best methods of carrying out this treatment.

Of the varieties tested Golden Wonder, Bishop and Field Marshal were found to be very susceptible, whilst Resistant Snowdrop, Catriona and Majestic proved highly resistant.

OXFORD UNIVERSITY.

WOODWARD (R. C.) and DILLON WESTON (W. A. R.). **Treatment of Sugar Beet Seeds to Prevent Seedling Diseases.** *Gard. Chron.*, March 23, 1929, also *Ann. App. Biol.*, vol. xvi, 4, Nov., 1929.

In order to find a satisfactory seed disinfectant ten materials were tested, including two proprietary organic materials containing mercury. One of the organic materials containing mercury gave outstanding results, and more

exhaustive tests of this material were undertaken. The results obtained were compared with dressings of carbolic acid applied by both sprinkling and steeping methods. The mercury material increased the plant in numerous trials in Northampton, Oxford and Cambridge by 50 per cent. under some conditions and in increasing amounts up to 193 per cent. under other conditions, and, further, the plant was stronger, as shown in one trial by an increased dry and fresh weight of 6·9 per cent. and 11·4 per cent. respectively. The results obtained with carbolic acid and with dry treatment were not so uniformly beneficial, the former being distinctly harmful on a number of occasions.

WOODWARD (R. C.), WALDIE (J. S. L.) and STEVEN, H. M. **Oak Mildew and its Control in Forest Nurseries.** *Forestry*, III, 1, 1929, pp. 38–56, also *Gard. Chron.*, June, 1929.

This investigation has shown the method of bud infestation, and the form in which the mildew overwinters. Based on this knowledge control of the disease by sprays was attempted and a good measure of success attended this.

Sprays, using colloidal sulphur—Ialine and Cosan—and calcium caseinate made up with flowers of suphur as a paste, at the rate of 2 to 4 lb. of sulphur per 100 gallons, successfully controlled the mildew. Calcium caseinate was a more efficient spreader than soft soap. Under favourable conditions one application may be sufficient, but usually three to five are necessary, the first one being made when the mildew first appears.

These treatments secure that more than half the plants are kept entirely free from mildew, height growth may be increased, and there is a great increase in the dry weight of the plants. Bud infection is decreased, and the proportion of the plants with good leaders is increased.

SOUTH EASTERN AGRICULTURAL COLLEGE, WYE.

GOODWIN (W.), SALMON (E. S.) and WARE (W. M.). **The Action of Certain Chemical Substances on the Zoospores of** *Pseudoperonospora Humuli* **(Miy. et Takah) Wils.** *Journ. Agric. Sci.*, 19, 185–200, Jan., 1929.

Phytophthora Humuli and *P. infestans* were found to be extremely susceptible in the zoospore stage to the action of weak solutions of soap or saponin. Other substances, *e.g.*, aluminium-lime mixture, glycerine, iodine and bromine, were found to kill zoospores rapidly. The fungicidal action of soap and saponin mixed with certain adherent substances was tested on hop plants.

GOODWIN (W.), SALMON (E. S.) and WARE (W. M,). **The Control of Apple Scab.** *Journ. S.E.A. Coll.*, 26, 34–46, July, 1929.

The results are given of spraying experiments in plantations at Wye College and on a farm near Canterbury. Home-made Bordeaux Mixture controlled scab on Allington Pippin (12 per cent. scabbed apples in the sprayed plots against 82 per cent. in the unsprayed).

Similar results were obtained with Newton Wonder.

On Worcester Pearmain home-made Bordeaux mixture gave better results than ready-made Bordeaux paste (Bordorite). Complete control of scab was not obtained, however, and the various factors concerned in this spraying experiment are discussed critically.

GOODWIN (W.), MARTIN (H.) and SALMON (E. S.). **The Fungicidal Properties of Certain Spray Fluids. V.** *Journ. Agric. Sci.*, 19, 405–412, July, 1929.

The fungicidal strength of dicalcium hydrogen arsenate and calcium thioarsenate was ascertained and the action of lime casein, when added as a

spreader to calcium arsenate. Evidence is given indicating that the increased fungicidal properties of the mixed lime-sulphur lead-arsenate spray may be due to the presence of calcium thioarsenate.

MACKENZIE (D.), SALMON (E. S.), WARE (W. M.) and WILLIAMS (R.). **The Mosaic Disease of the Hop; Grafting Experiments. II.** *Ann. App. Biol.*, 16, 359–381, Aug., 1929.

Experiments showed that when scions of varieties of hops susceptible to mosaic disease were grafted on German, American, Danish, English and Seedling varieties, they developed typical mosaic disease. It appears therefore, that "carrier" varieties are common among commercial varieties of hops. Certain male hops also proved to be "carriers." As a rule, the "carrier" varieties show no trace whatever of mosaic disease; the leaves are of normal colour and the plant shows normal growth with high fertility. Scions of the commercial variety "Fuggles," when grafted on "carrier" plants, invariably remained healthy.

SALMON (E. S.). **The Downy Mildew Problem in Germany.** *Brewers' Journ.*, vol. 65, 155–157, Mar. 15, 1929.

A critical review is given of four recently-published technical bulletins of the phytopathological services in Wurtemberg, Germany. The incidence of the Downy Mildew of the Hop and the control measures, including the programme and technique of spraying, are dealt with.

SALMON (E. S.). **Recent Research in Germany on the Hop Downy Mildew.** *Brewers' Journ.*, vol. 65, 412–413, Aug. 15, 1929.

A critical review is given of three recently-published technical bulletins of the phytopathological service in Bavaria, Germany. The subjects dealt with comprise recently discovered facts in the life-history of the fungus, the necessary control measures, including spraying and its effect on the brewing value of the cones, and the national organisation of Advisory Centres and Information Bureaux.

SALMON (E. S.) and GOODWIN (W.). **Notes on a Visit to Certain Hop-Growing Districts in Bavaria and Wurtemberg, with special reference to the control of Downy Mildew.** *Journ. Inst. Brew.*, 35, 75–80, Feb., 1929.

A description is given of the incidence of Downy Mildew in hop gardens in Bavaria and Wurtemberg and of the control measures in force. The situation as regards the outbreak of the disease in Germany and the various factors concerned with its control are discussed and compared with that in England.

SALMON (E. S.) and WARE (W. M.). **The Downy Mildew of the Hop in British Columbia.** *Brewers' Journ.*, vol. 65, 49, Jan. 15, 1929.

Examples of the Downy Mildew of the Hop were received from British Columbia in December, 1928. Microscopic examination showed the fungus to be identical with that known on cultivated hops in Europe. This is the first record of the occurrence of the disease in Canada. Hop-growing countries from which the disease is at present absent—*e.g.*, Tasmania, N. Zealand and S. Africa—are advised to prohibit the importation of hop roots from Europe and Canada.

SALMON (E. S.) and WARE (W. M.). **The Downy Mildew of the Hop in 1928.** *Journ. Inst. Brew.*, **35**, 20–25, Jan., 1929.

In 1928 a general and serious attack of Downy Mildew occurred on the tips of trained-up "bines," leading in some cases to a diminution of the crop. It is recommended that reserve "bines" should be trained up. Spraying hops with Bordeaux mixture was carried out for the first time in this country in 1928. Details are given of the various factors concerned.

SALMON (E. S.) and WARE (W. M.). **Downy Mildew in the Hop Rootstock and in Strap-cuts.** *Journ. Kent F. U.*, 25, 54, Feb., 1929.

The presence of the mycelium of Downy Mildew was ascertained in the "strap-cut." Different forms of bud-attack were also met with.

SALMON (E. S., and WARE (W. M.). **Two Downy Mildews of the Nettle: *Pseudoperonospora Urticae* (Lib.) Salm. et Ware, and *Peronospora de Baryi* nomen novum.** *Trans. Brit. Mycol. Soc.*, 14, 38–60, March, 1929.

A monographic description, based on examination of living and herbarium material, is given of two species of Downy Mildew which attack the Nettle. The old "*Peronospora Urticae*" of Berkeley is shown to belong to the genus *Pseudoperonospora*; and a distinct species (occurring on *U. urens* only) which was wrongly identified by de Bary as *P. Urticae* is named *P. de Baryi*.

WARE (W. M.). **Note on *Rhizoctonia Crocorum* (Pers.) D.C.** *Trans. Brit. Mycol. Soc.*, **14**, 94–95, March, 1929.

The occurrence of *Rhizoctonia Crocorum* on *Medicago lupulina* is recorded, and the significance of the later appearance of *Helicobasidium purpureum* on the same host is also discussed.

(K) HELMINTHOLOGY.

LONG ASHTON FRUIT RESEARCH STATION.

STANILAND (L. N.) and SWARBRICK (T.). **Experiments on the Relation of Strawberry Eelworm** (*Aphelenchus fragariae*) **to "Red Plant" and "Cauliflower" Disease of Strawberries.** Progress Report. *Ann. Rep. Agric. and Hort. Res. Long Ashton, Stn.*, 1928. Also in *Journ. Bath and West Soc.*, Series 6, vol. iii., 1928-29.

Experiments are described dealing with this relation. It is shown that the evidence is not conclusive for the causal relation between eelworm and these strawberry troubles. The work is being continued.

INSTITUTE OF AGRICULTURAL PARASITOLOGY.

BUCKLEY (J. J. C.) and CLAPHAM (P. A.). **The Invasion of Helminth Eggs by Chytridiacean Fungi.** *Journ. Helm.*, vol. vii, No. 1, Mar., 1929.

Two Chytridiacean fungi, *Catenaria anguillulae*, and *Rhizophidium carpophilum*, were found attacking ova of *Dibothriocephalus latus*. The source of infection was proved to be the fresh-water tanks supplying the laboratory. Other Trematode, Cestode and Nematode eggs were experimentally infected. The life-history, including the resting spore of *Catenaria*, is described and various experiments on the viability of the fungi under septic tank conditions were carried out with a view to their use as a control in helminthiasis.

GOODEY (T.). **On Some New and Little-known Free-living Nematodes.** *Journ. Helm.*, vol., vii, No. 1, Mar., 1929.

The following new genera and species are described. *Rhabditoides coprophaga*, gen. et. sp. n. from sheep droppings on pasture; *Butlerius butleri* gen. et. sp. n. from decaying banana roots, *Rhabdites pseudoxycerca* n. sp., from pig manure; *Diplogaster vorax* n. sp., a predatory carnivorous species from pig manure; *Diplogaster microstoma* n. sp., from the same; *D. winchesi* n. sp., from rotting leaves. Detailed descriptions and additional information are given on *Rhabditis oxycerca* de Man, 1895.

GOODEY (T.). **Observations on** *Tylenchus musicola* **Cobb, 1919, from diseased Banana Roots.** *Journ. Helm.*, vol. vi, No. 4, Dec., 1928.

A detailed account is given of the anatomy of the adult male and female of *Tylenchus musicola*, a species of parasitic nematode described originally by Cobb from preserved material of banana roots from Grenada, West Indies. The present material came from Kew Gardens and the worms were obtained in a living condition, which rendered it possible for the structure and arrangement of the various organs in both sexes to be studied in greater detail than had been possible to previous investigators.

GOODEY (T.). **A Note on the Identity of the Nematode Genera** *Anguillulina* **and** *Tylenchus*. *Journ. Helm.*, vol. vii, No. 3, July, 1929.

According to Baylis and Daubney, by the strict application of the Law of Priority, *Tylenchus* Bastian, 1865 should give place to *Anguillulina* Gervais and van Beneden, 1859, but attention is drawn to the fact that a petition is being prepared by workers interested in the question in U.S.A. for the retention of the name *Tylenchus* on the grounds of its long and wide usage.

LEIPER (R. T.). **Landmarks in Medical Helminthology.** *Journ. Helm.*, vol. vii, No. 2, June, 1929.

Helminthology as a separate subject began as early as the middle of the 17th century, and the first English textbook was written by Sir William Ramesey, Physician to His Majesty King Charles the Second. From the earliest times the subject has included, not merely a study of the structure and bionomics of the parasites, but also the host reactions and curative and preventive measures. The paper records each important advance and concludes with the suggestion that the field of helminth physiology has been least explored.

LEIPER (R. T.). **A Cryptic Infection with** *Dibothriocephalus latus*. *Journ. Helm.*, vol. vi, No. 4, Dec., 1928.

Dibothriocephalus latus develops in man, dog and cat, and has been associated in medical literature with a pernicious type of anaemia. This paper records observations on an experimental infection extending over a period of five years in which the early blood changes reverted to normal and were not succeeded by anaemia. There were only slight liver disturbances.

MORGAN (D. O.). **On the Morphology and Biology of a Larval Stage of** *Muellerius capillaris* **(Mueller, 1889), Cameron, 1927; a Lungworm of Sheep and Goats.** *Journ. Helm.*, vol. vii, No. 3, July, 1929.

The larval stage of *Muellerius capillaris* found in the droppings of sheep and goats is here described in detail; an account is also given of some experiments on its biology. The larva is compared with a similar larval stage in the cat lungworm *Aleurostrongylus abstrusus* which, so far, is the only parasite of this group whose life-history is known. A note on the incidence and on the pathology of the parasite is added.

MORGAN (D. O.) and PETERS (B. G.). **The Potato-Root Eelworm in Lincolnshire.** *Journ. Helm.*, vol. vii, No. 2, June, 1929.

In the light of their previous studies on the distribution of the potato-root eelworm in Lincolnshire, and its relationships with the pathology of the plants and the acidity of the soil, the authors have discussed the results of a subsequent investigation over a wider area. In this case the three factors—distribution, pathology and acidity—have been subjected to statistical treatment as a result of which it is shown that there is a correlation between the pathology of the plants and the number of cysts in the surrounding soil. The correlation between cysts and acidity is not statistically obvious.

MORGAN (D. O.). **A New Nematode Species of the Genus** *Viannaia* **from the Mole** (*Talpa europaea*). *Journ. Helm.*, vol. vi, No. 4, Dec. 1928.

A description is given of a new Trichostrongyle, *Viannaia talpae*, from the mole, together with a discussion on its systematic position.

MORGAN (D. O.). **On the Infective Larva of** *Ostertagia circumcincta* **(Stadelmann, 1894), a Stomach Parasite of Sheep.** *Journ. Helm.*, vol. vi, No. 4, Dec., 1928.

A detailed description of the morphology of the infective larva of *Ostertagia circumcincta*, a stomach parasite of sheep, is given, and a comparison is

made with the same stage in the larval development of other helminths. The biology of the larva is similarly treated.

TRIFFITT (M. J.). **Preliminary Researches on Mustard as a factor inhibiting cyst-formation in** *Heterodera schachtii*. *Journ. Helm.*, vol. vii, No. 2, June, 1929.

Attempts to infect mustard plants with *Heterodera schachtii* led to the discovery that mustard seedlings broken into infected soil in which potatoes were growing protected the potatoes to some extent from attack. A 60 per cent. reduction in the cyst count on plants so treated was found to be usual. The addition of other organic matter to the soil did not produce a like result. The roots of mustard plants were found to be more efficient than shoots in effecting the reduction, while the influence of living mustard plants grown with the potato was even more marked.

TRIFFITT (M. J.). **Observations on the incidence of** *Heterodera schachtii* **at the Ormskirk Potato Testing Station.** *Journ. Helm.*, vol. vii, No. 2, June, 1929.

The cyst content of various plots of infected land was estimated. The morphology of the cysts on one lightly infected plot was found to differ from those extracted from the other plots, and it is suggested that some weed present on this land might be parasitised. Experiments to determine the effect of the passage of cysts through pigs showed that death of the contained larvae and eggs results from such ingestion.

TRIFFITT (M. J.). **Further Observations on the Morphology of** *Heterodera schachtii*, **with remarks on the Bionomics of a strain attacking Mangolds in Britain.** *Journ. Helm.*, vol. vii, No. 3, July, 1929.

The morphology of *Heterodera schachtii*, as the parasite occurs on beet, oats, hops, mangolds and potatoes, is described. Field observations on the strain attacking mangolds and the results of experimental transmission of this strain to other hosts are detailed. The variations in morphology produced by change of host and other factors such as soil conditions are discussed, and the conclusion that morphological variations between specialised strains should not be regarded as being specific in character is emphasized.

MINISTRY OF AGRICULTURE AND FISHERIES, VETERINARY LABORATORY.

TAYLOR (E. L.). **The Common Lung Worms of Cattle, Sheep and Goats.** *Journ. Min. Agric.*, 1929, vol. xxxvi, No. 3, June, p. 229.

A short popular description of the disease and the worms responsible, with an account of occurrence, life history, and methods of control.

TAYLOR (E. L.). **Worms and Worm Diseases of Poultry.** *Journ. Min. Agric.*, 1929, vol. xxxvi, No. 6, Sept., p. 533.

A short popular description of the common Nematode and Cestode parasites of poultry, with notes on the conditions they cause, life histories and methods of control.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

RICE (J. P.). **The Rook as a Source of Gapeworm Infection. 1929.** *Journ. Min. Agric. N. Ireland.*

Examination of rooks (*Corvus frugilegus*) in Northern Ireland over a period of five years showed them to be heavily infested with gapeworms (*Syngamus trachea*).

A carefully-controlled experiment proved that the gapeworm of rooks can cause "gapes" in chickens.

HARPER ADAMS AGRICULTURAL COLLEGE.

EDWARDS (E. E.). **The Control of a Serious Potato Trouble.** *Journ. Min. Agric.* vol. xxxvi, June, 1929.

Detailed description is given of the symptoms of the disease, together with the results of pot experiments designed to ascertain its real cause. The experiments point very much to the eelworm *Heterodera schachtii* and the fungus *Corticium solani* as being the causative organisms.

In addition an account is given of comparative control trials, on a commercial scale, of soil treatment by certain chemical substances. The most promising results were obtained with Drained Creosote Salts, Carbon bisulphide, Calcium cyanide and Calcium cyanamide. It is concluded that "Drained Creosote Salts" are likely to prove of most economical value in the control of this serious Potato trouble.

LEEDS UNIVERSITY.

STRACHAN (J.) and TAYLOR (T. H.). **The Potato Eelworm.** *Departmental Bull.* No. 159.

The potato eelworm, since its discovery in Yorkshire in 1916, has been found in many districts. The worm is often associated with poor-yielding crops and it is thought by growers to be the cause of the loss, but since fungus diseases are generally present at the same time it is not certain whether their interpretation is correct. Box experiments, however, which have been carried out in eelworm infected soil seem to show that an improvement in yield follows the use of organic manures.

MANCHESTER UNIVERSITY.

SMITH (A. M.) and PRENTICE (E. G.). **Investigation on *Heterodera schachtii* in Lancashire and Cheshire. Part I. The infestation in certain areas as revealed by cyst counts; an estimation of the errors involved in the technique and a correlation with intensity of disease.** *Ann. App. Biol.*, vol. xvi, No. 2, May, 1929.

Heterodera schachtii has been identified in many parts of Lancashire and Cheshire, where severe losses have resulted from failure of the potato crop.

A detailed study of the errors involved in the technique of a method for estimating the infestation has been made, and the conclusions are that (*a*) where "eelworm disease" has been noted recently there is a positive association of intensity of disease and cyst content of the soil; (*b*) where the disease was observed three or four years ago, disease and crop failure are always associated with a high cyst content of the soil, but there may be moderately high infestation without apparent diminution of crop yield.

Smith (A. M.). **Investigations on *Heterodera schachtii* in Lancashire and Cheshire. Part 2. The relationships between degree of infestation and hygroscopic moisture, loss on ignition and pH value of the soil.** *Ann. App. Biol.*, vol. xvi, No. 2, May, 1929.

From an examination of the physical properties related to the moisture and temperature conditions of the soil it seems improbable that the rate of reproduction of *H. schachtii* is influenced to a marked degree by normal variations in the field. A significant negative correlation has been found to exist between pH value and cyst count for a group of peat soils.

Miles (H. W.) and Smith (A. M.). **Investigations on *Heterodera schachtii* in Lancashire and Cheshire. Part III. Certain Correlations between Crop Yields and Degree of Infestation.** *Ann. App. Biol.*, vol. xvi, No. 4, pp. 596–601.

The authors have collected and examined data regarding infestation by potato eelworm (*H. schachtii*), certain soil properties and crop yields from certain series of plots at four centres where potato sickness was prevalent. Critical examination leads to the conclusion that infestation by eelworm is not of primary importance in determining the yield of potatoes. Eelworm infestation, as reflected by cyst content of the soil, increases only as a crop which is not a failure, but which has been adversely influenced by some other factor or factors.

SEALE HAYNE AGRICULTURAL COLLEGE, NEWTON ABBOT, DEVON.

Hobson (W. E. H.) and Gibson (Gordon W.). **Some Experiments with Calcium Cyanide as a Control for Plant Parasitic Nematodes.** *Ann. App. Biol.*, xv, No. 4, Cambridge, Nov., 1928.

A number of experiments are described in which granular calcium cyanide (Cyanogas Grade C) is used as a soil fumigant against the stem and bulb eelworm (*Tylenchus dipsaci*) and the root knot eelworm (*Heterodera radicicola*). The conclusions reached are to the effect that the successful use of the substance against plant parasitic nematodes, on a commercial scale, is not possible under conditions pertaining to this country.

Hobson (W. E. H.). **The Occurrence of *Tylenchus dipsaci* Kuhn, in Wild Host Plants in South-East England.** *Journ. Helm.*, vol. vii, No. 3, pp. 143–15, 2, July, 1929.

It is established that *T. dipsaci* is commonly present in *Hyacinthus orientalis* and *Ranunculus spp.* in S.E. England and that pest transmission of the nematode is local. The significance of this discovery in relation to attacks by the nematode on cultivated plants is discussed.

SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, KENT.

Tennant (the late P. T.). **Black Wheat or Earcockles *Tylenchus tritici*.** *Reprint from Surrey Advertiser*, Sept. 28, 1929.

Gives a general illustrated account of this wheat pest, which in Surrey caused in some cases 40 per cent. of grain loss. The life-cycle of the Nematode worm (*Tylenchus tritici*) which causes the Black Wheat is given and general treatment. If the grain is required for seed, soaking the seed for a few minutes in a 20 per cent. saline solution is recommended; the galled grain readily floats to the top and can be easily skimmed off, whilst the sound grain sinks. This treatment was found quite as successful as the more serious sulphuric acid treatment adopted on the Continent.

(L) ANIMAL HUSBANDRY
(general and not classifiable under M, N, O and P).

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

STAPLEDON (R. G.). **Intensive grazing of pastures.** *Journ. Roy. Welsh Agric. Soc.*, 1928, p. 39.

In this short paper it is pointed out with reference to the intensive grazing and manuring of grassland that the various operations that are necessary should be considered to be quite as flexible as those connected with arable farming, and it is emphasized that those who are concentrating attention on the better management of their grassland should not allow themselves to be guided too rigidly by fixed rules, but should act largely according to experience and the needs of the moment.

From the economic point of view what it is most important for the farmer to ascertain is the minimum amount of manurial dressings that would produce the maximum results, and probably most turns upon the most advantageous dates for applying nitrogenous manures equally with the use of the mowing machine, harrow and spread of droppings. Experience alone can teach how often it is really best to conduct each of these operations.

ANIMAL BREEDING RESEARCH DEPARTMENT, EDINBURGH.

CHAUDHURI (A. C.). **A Study on the Pigmentation of the Himalayan Rabbit.** *Proc. Roy. Phys. Soc.*, vol. xxi, Pt. 4, 1928.

The phenomenon of pigmentation in the Himalayan rabbit is discussed and a series of experiments relating to this matter described. It appears that the black coloration of the extremities is due to the relatively low temperature at these points and that similar coloration can be induced in parts normally white by sponging with cold water.

HUTT (F. B.). **Potentially Fatal Fatigue of Cervical Muscles of the Fowl Resulting from an Excessively Large Comb.** *Vet. Jour.*, vol. 84, No. 11, 1929.

This paper reports a case of two cocks with very large combs which were brought to the verge of death as a result but were cured when their combs were cut off. The size of the comb in each case appeared to be due to the tendency to breed for a large comb.

PICKARD (J. N.). **Studies on the Wool Production of Angora Rabbits.** *Hints to Rabbit Keepers, Harper Adams Jour.*, No. 34, 1928.

Angora bucks exhibit a seasonal variation in wool yield, the heaviest growth being in September to December; and wool production increases in young rabbits until they are eight months old. It is suggested that April-born youngsters produce greater yields in the first year than do others.

PICKARD (J. N.) **Points about Wool Test and Research Work.** *Universal Angora Club Y. B.*, 1928.

A note on the objects of the proposed Wool Test with special reference to the connection between it and research work.

PICKARD, (J. N.) **Research and the Angora.** *Mid. Ang. Rabbit C Y. B.*, 1929.

A brief account of some recent research work carried out on Angora and other varieties of Rabbits.

NATIONAL INSTITUTE OF POULTRY HUSBANDRY.

(Harper Adams Agricultural College),

NEWPORT, SALOP.

BOBBY (F. C.). **The Influence of Confinement on the Production of White Leghorn Pullets.** *Harper Adams Utility Poultry Journ.* vol. xiii, No. 10, 1928.

White Leghorn pullets confined behind a glass-fronted pen which prevented any direct rays of sunlight reaching them decreased in production and developed a condition resembling rickets. The use of an open-fronted pen and the use of cod liver oil or free access to a grass run supplied the necessary accessory food factor, the absence of which appears to result in decrease of egg production and the development of rickets.

DUDLEY (F. J.). **The Death Rate of Three Standard Breeds of Fowl during the Pullet Year.** *Poultry Science,* vol. vii, No. 6, 1928.

Harris and Boughton in a previous issue of *Poultry Science* have reported a difference in the death rates of White Wyandottes, Rhode Island Reds and White Leghorns in the Storrs Egg Laying Contest. Mr. Dudley shows that by his interpretation of the Storrs data it cannot be definitely stated that a real difference exists between the three breeds. He goes on to show that a study of 15 years' data from the Harper Adams Agricultural College Laying Trials shows no evidence in support of the assumption that these three breeds show essentially different death rates in their pullet years.

MACFADZEAN (DOROTHY). **The Influence of Confinement on the Production of White Wyandotte Pullets.** *Harper Adams Utility Poultry Journ.*, vol. xiv, No. 12, 1929.

This report gives in detail the results of an experiment covering a 40 week period from October, 1928. It confirmed the previous work of 1925–26 and 1926–27 with White Leghorn pullets. White Wyandotte pullets seemed to be less susceptible to rickets than the White Leghorn. There was, however, a sub-normal ash content in the tibias in birds confined behind ordinary window glass compared to those in an open-fronted pen, not confined, or confined and given 2 per cent. of veterinary cod liver oil in the scratch feed. There was no significant difference in the weight of eggs observed.

WILSON (W. KING). **The Economic Importance of Rabbit Flesh.** *Harper Adams Utility Poultry Journ.*, vol. xiv, No. 11, 1929.

This report deals with the geographical distribution, volume, and pecuniary value of trade in rabbit meat and, secondly, with the composition of rabbit meat as determined by chemical analyses. Certain data on the depreciation of carcass weight during the dressing processes are also given. The chemical analyses of rabbit meat show it to be very similar to chicken and to have a protein content that compares favourably with other common fleshes. Female rabbits contain a higher percentage of fat than males. The depreciation of carcass weight during the dressing process is greater in males than in females.

(M) ANIMAL BREEDING AND PHYSIOLOGY.

DEPARTMENT OF ANIMAL PATHOLOGY, CAMBRIDGE.

BELLERBY (C. W.). **The Relation of Anterior Lobe Pituitary to Ovulation.** *Journ. Physiol.*, 1929, 67, xxxii.

Ovulation and the formation of the corpus luteum in the rabbit occur normally only after copulation. No explanation has so far been given of the mechanism involved.

Experiments are recorded which show that following intravenous injections of extracts of anterior lobe pituitary into anaesthetised rabbits, ovulation occurs at approximately the same time as after copulation.

The results obtained suggest that the act of copulation stimulates the gland to secrete a hormone which initiates changes in the follicles which result in their rupture.

BELLERBY (C. W.). **The Physiological Properties of Anterior Lobe Pituitary Extract in Relation to the Ovary.** *Journ. Physiol.* 1929, 67, xxxiii.

Extracts obtained from the anterior lobe pituitary with dilute acetic acid when injected subcutaneously into mature or immature rabbits induce the formation of large numbers of follicles.

These may be so numerous that the ovaries finally come to consist almost exclusively of liquor folliculi. Mating of these animals is followed by the wholesale formation of corpora lutea. Many of the follicles may become converted into corpora lutea without mating.

INNES (J. R. M.) and BELLERBY (C. W.). **Spontaneous Deciduomata in the Rat.** *Journ. Physiol.*, 1929, vol. lxvii, proc. xxxiv.

Single injections of an anterior lobe pituitary extract produce pseudo-pregnant periods of from 2–3 weeks' duration. The end of the period is often marked by a discharge of blood from the vagina and the presence of swellings in the uterine horns, histologically identical with deciduomata produced in normal pseudo pregnancy by injury to the uterine mucosa. It is suggested that this dysgenic hyperplasia of the uterus is induced by luteal tissue formed in the ovaries as a result of the injection of anterior lobe pituitary extract.

ANIMAL NUTRITION RESEARCH INSTITUTE, CAMBRIDGE.

HAMMOND (J.). **Die Kontrolle der Fruchtbarkeit bei Tieren.** *Zeit. Züchtungskunde Bd.*, 3, Ht. 11, 1928, pp. 523–547.

A summary of recent work on the control of fertility in domestic animals is given under the following headings :—

The Breeding Season.—The effect of the season of the year on reproductive activities is illustrated by egg curves of the fowl in England compared with those in Australia, and it is suggested that this may be due to a special substance "Generative ferment" on which the activities of the reproductive organs depend. The time of year variation in egg production is of greater importance than that caused by differences in energy nutrition in determining egg yield.

The Number of Eggs which Ripen.—That this depends on some substance circulating in the blood (generative ferment) and not on the ovarian tissue is shown by the fact that removal of one ovary causes double the normal number of eggs to ripen in the remaining ovary, and so maintains the fertility at a constant level. Varieties in fertility due to age, breed and bodily

nutrition, as well as the rhythm of the oestrus cycle and the effects of lactation on reproduction, are explained on the basis of the production or use of this special substance. This factor is of especial importance in the sheep.

The Number of Eggs which get Fertilised.—Since it has been found in the rabbit that if the egg is not fertilised within a few hours after it leaves the ovary it perishes and that the male sperms are capable of fertilising eggs only for a period of about two days after they are deposited in the female tract, it would appear that the time of mating in relation to the time of ovulation is important.

By regulating the time of mating, litters of 1 or 2 can be produced from rabbits which would normally produce 8 to 10. In mares where the length of heat is long (7 days) the factor may be of importance as the low fertility (54%) of travelling stallions suggests; moreover, in such cases the differences in the fertility of males is much more obvious than in these cases where the heat is short and ovulation follows quickly after mating. Differences in male fertility may be shown up in the latter case by making double matings of a recessive coloured female to a dominant and a recessive coloured male in quick succession.

The Number of Fertilized Eggs which Develop to Birth.—In many species, and particularly in the rabbit and pig, a number of the young perish in the uterus and are absorbed or are expelled in a mummified condition with the after-birth. It has been found possible, by in-breeding to a doe which produced these atrophic foetuses, to obtain a strain in which on the average only four normal young are born although 12 eggs are shed. This character appears to be maternal and not due to the genetic make up of the foetus since such does produce atrophic foetuses whether mated with bucks of their own strain or with bucks of other highly fertile strains.

Artificial Insemination.—The possibilities of transmitting semen by post and, with the development of quick aeroplane transport, of extending the use of the best males had led to investigation of the conditions which affect the life of the sperm outside the body. The optimum temperature is about 50° F., at which young rabbits have been obtained after the sperm had been kept outside the body up to 6 days; at lower temperatures the life is much shorter while at lowly temperature the sperm will live only for about 12 hours.

HAMMOND (J.). **Fertility in Pigs.** *Pig Breed. Ann.*, 1929–30, p. 23.

The processes of reproduction and the factors affecting fertility (as given in the preceding summary—but with special reference to the pig) are discussed.

HAMMOND (J.) and WALTON (A.). **An Attempt to Cross Hare and Rabbit.** *Journ. Genet.*, vol. xx, No. 3, p. 401, Jan., 1929.

The possibility of making the hare-rabbit cross was tested by methods of artificial insemination, which had proved successful with rabbit sperm. Doe rabbits inseminated, after a sterile coitus, with sperm obtained from the epididymes of freshly killed hares failed to produce young.

HAMMOND (J.). **The Physiology of Ruminant Digestion.** (Paper read to the Scot. Metropolitan Div. of the Nat. Vet. Med. Assoc. of Gt. Britain, Nov. 21st, 1928.) *Vet. Record*, No. 17, vol. ix, Apr., 1929, p. 343.

The broad outlines of the problems of ruminant digestion are dealt with in the light of recent research. The rate of development of the parts of the

digestive tract varies with the type of food fed to the young animal. In the young calf the oesophageal groove functions and conducts milk directly to the 4th stomach but in adult life the groove becomes atrophic and ceases to function.

The Demands for Nutrition from the digestive tract in the modern high milking cow are so great that the leisurely process of digestion as it existed in the wild animal has to be speeded up or otherwise the milk yield falls or the cow will milk the flesh off her bones and fall a prey to disease. The methods by which the process of digestion can be speeded up are (1) by cutting down bulk or cellulose in the ration as this takes a long time to digest; the amount of fibre depends on the stage of development of the plant: (2) by feeding "light" rather than "heavy" feeds; the latter, such as bean meal, maize meal, or ground wheat, when fed in large quantities form a heavy doughy mass in the stomach which takes a long time to digest and puts the animal off her feed, whereas "light" foods such as flaked maize or sugar beet pulp crumble and do not set when moistened and kneaded; it is suggested that, as well as being kibbled for this purpose for sheep feeding, inferior barley and wheat might be flaked or puffed as these grains are prepared for human breakfast foods: (3) by giving foods which have a moderately laxative effect, which is one of the advantages of succulent foods: (4) by mixing foods containing fibre with succulents before feeding so that the preliminary process of softening and fermentation may save time for this within the animal.

The Mechanism of Digestion is Described. There is little if any starch splitting ferment in the saliva of the ox or sheep. The ruminants bolt their food; nails as a result are frequently found in the reticulum (or 2nd stomach). A plentiful supply of water is required for rumination which ceases if this is withheld. Recent investigators have shown that in re-swallowing after rumination the food is returned to the first two stomachs again and goes from there to the third and fourth stomachs, while the oesophageal groove does not function in the adult as was formerly supposed to occur in the second swallowings and in drinking water. The nature of the food has considerable influence in increasing or diminishing the necessity for the process of rumination.

WALTON (ARTHUR) and FAIR (T. KEITH). **Preliminary Investigation on the Fecundity of Premium Stallions.** *Journ. Agric. Sci.*, vol. xviii, pt. 4, Oct., 1928.

The semen of a limited number of stallions with varying fertility was examined. The results indicate that microscopic examination of the semen may be diagnostic of fertility, the more fertile stallions having a larger number of active spermatozoa. It was also found that failure to ejaculate during an otherwise normal service may be a frequent cause of infertility.

WALTON (ARTHUR). **Rejuvenation. The Work of Steinach and Voronoff.** *Eugen. Rev.*, vol. xx, No. 4, Jan., 1929.

This article is a critical review in which it is held that the advocates of glandular "rejuvenation" have made a claim to which an answer is undoubtedly required. If the facts are in accordance with the claims made eugenic social and agricultural problems of importance are raised. The chief difficulty which arises in assessing these claims is the absence of critical experimentation, and it is to the latter and not to hypothetical discussion that one must look for an answer.

WALTON (A.) and HAMMOND (J.). **Observations on Ovulation in the Rabbit.** *Brit. Journ. Exp. Biol.*, vol. vi, No. 2, p. 190, Dec., 1928.

Ovulation has been directly observed in the anaesthetised rabbit and the process is illustrated by drawings. The follicles rupture, on the average,

about 10 hours after coitus, but there is some variation and all follicles do not rupture simultaneously. Ovulation is not the invariable consequence of the normal growth of the follicles, and although confined to those which are mature, is independent of the actual size attained. Ovulation is accompanied by increased vascularity of the follicle. The principal cause of rupture is the rapid distention of the follicle by marked secretory activity. The ovum is carried out in the flow of this secretion. Ovulation in the rabbit is initiated by some component of the organism which accompanies coitus rather than by the mechanical stimulus of the penis or the presence of semen in the vagina. Corpora lutea are not formed if the follicle is ruptured artificially and this effect is not due to operative trauma but to the absence of some effect of coitus necessary for the formation of the luteal tissue. Artificial rupture or ablation of ripe follicles is followed by an immediate compensatory growth of new follicles. Blood follicles formed from those artificially ruptured do not inhibit this compensatory growth.

SMALL ANIMAL BREEDING RESEARCH INSTITUTE, CAMBRIDGE.

PEASE (M. S.). **Yellow Fat in Rabbits—a Linked Character?** *Verh. V. Intern. Kongr. f. Vererbungswiss*, vol. ii., pp. 1153–6, Berlin, 1928.

A strain of rabbits has been found in which, under ordinary conditions, the fat is bright orange-yellow in contradistinction to the usual pure white. When, however, these rabbits are fed on food lacking xanthophyll, the fat is white. Chemical tests have shown the yellow pigment to be due to xanthophyll. Genetically this pigmented condition is determined by a simple recessive factor; dominance is perfect. There is very close linkage between this factor and the factor which determines pigmented as against albino fur.

PEASE (M.S.). **Experiments on the Inheritance of Weight in Rabbits.** *Journ. Genet.*, vol xx, No. 2, pp. 261–309, Nov., 1928.

In a cross between Polish and Flemish rabbits it was found that the F_1 was intermediate in weight, showing no sign of hybrid vigour. In F_2 the entire range of weight was obtained, but this entire range was given by the progeny of only a few of the F_1 animals. Some of the light F_2 animals bred true for light weight, but it was not possible to find a pair of heavy F_2 animals which bred true for heavy weight. By arranging the frequency curves on a logarithmic scale, it becomes clear that weight factors act in a logarithmic manner.

In the course of inbreeding, the Polish stock sterility was encountered and evidence was found for the action of a simple mendelian sterility factor. The effects of inbreeding on both the Polish and the Flemish stock are described and discussed.

An account is given of the effect on weight of growth, sex, colour, litter size, and season of birth.

From the Polish-Flemish F_2 there were selected a rapid and a slow maturing strain of rabbits.

PEASE (M. S.). **Simple Mendelism.** *Cairn Terriers' Assoc. Y. B.* 1929.

PEASE (M. S.). **Mendelism.** *Pig Breed. Ann.*, 1929, pp. 44-8.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

Fisher (R. A.). **Two Further Notes on the Origin of Dominance.**

Amer. Nat., 1928, vol. lxii, pp. 571–574.
Abstracted under "D."

ROWETT RESEARCH INSTITUTE, ABERDEEN.

Magee (H. E.) and Southgate (B. A.). **Influence on Intestinal Movements of Electrolytes in the Lumen of the Isolated Segments.** *Journ. Physiol.*, lxviii, No. 1, Aug., 1929.

In isolated segments of intestine the pressure in the lumen was found to be the factor of greatest importance in determining the commencement of peristaltic contractions. The minimum (threshold) pressure was greater for the duodenum than for the ileum and greater for carnivora than for herbivora. The results suggested that the mucous membrane exercised a very efficient protective action against harmful substances present in the lumen.

Magee (H. E.), Anderson (W.), and McCallum (J.). **Some Remote Effects of Deficient Diets on the Rhythmical Movements of the Isolated Intestine.** *Quart. Journ. Exp. Physiol.*, xix, No. 2, 1928.

In cavies, diets deficient in fat soluble vitamins and in calcium, sodium and chlorine produced disorganisation of the rhythmical movements of the small intestine. The dysfunction was of a hypersensitive or of a hyposensitive type.

Magee (H. E.) and Macleod (J. J. R.). **Diffusion Through the Wall of the Living and the Dead Intestine.** *Journ. Physiol.*, lxvii, Jan., 1929.

Previous work at the Institute having shown that the mucous membrane of surviving intestine resisted the passage of electrolytes from the lumen, the rate of diffusion of sugars and salts through the wall of surviving and dead segments of intestine was tested. It was found that the rate was much greater in the case of segments killed by heat or by fluoride than in the case of surviving living segments.

ANIMAL BREEDING RESEARCH DEPARTMENT, EDINBURGH.

Crew (F. A. E.). **Disease Resistance.** *Paper for discussion at Annual Congress of the Nat. Vet. Med. Ass. at Newcastle-on-Tyne,* 1928.

Crew (F. A. E.). **A Case of Lateral Asymmetry in the Domestic Fowl.** *Journ. Genet.*, vol. xx, No. 2.

A fowl with the left side of the body larger than the right is described. It is shown that, though the size difference is similar to that distinguishing male and female this bird was most probably not a gynandromorph.

The lateral asymmetry is explained on the assumption that an autosome carrying white had been eliminated during the early cleavage divisions of a male zygote heterozygous for the characters white and yellow epidermal pigmentation.

CREW (F. A. E.). **A Hen with Two Vents.** *Vet. Journ.*, vol. lxxxiv, No. 7, 1928.

A brief report of an abnormal fowl which was of special interest to the comparative anatomist.

CREW (F. A. E.). **Genetical Methods of Livestock Improvement.** *Sci. Agric.*, vol. ix, No. 14, 1929.

FRASER (A. C.) and WIESNER (B. P.). **Variations of the Rest Metabolism of the Rat in Relation to the Sex Cycle.** (*In the press.*). 1929.

The authors show that the rest metabolism of the rat is subject to great variations closely correlated with the oestrous cycle.

GREENWOOD (A. W.) and BLYTH (J. S. S.). **An Experimental Analysis of the Plumage of the Brown Leghorn Fowl.** *Proc. Roy. Soc., Edin.*, vol. xlix, pt. 4, 1929.

The dependence of the plumage of the Brown Leghorn upon the activity of the thyroid and gonad was examined and it was found that hypothyroidism brings about (*a*) a diminution of melanin and an increase of red pigment, (*b*) an increase of the amount of fringing due to barbule formation. Hyperthyroidism gives an opposite reaction. It is suggested that male plumage is not influenced by the gonad but by the thyroid. In the female it appears that both gonad and thyroid affect the plumage characterisation.

HUTT (F. B.). **On the Relation of Fertility in Fowls to the Amount of Testicular Material and Density of Sperm Suspension.** *Proc. Roy. Soc., Edin.*, vol. xliv, pt. 2.

Within wide limits the fertility of the male fowl is not dependent upon size of testes nor is there any relation between density of sperm suspension and fertility within the range in the former from 825,000 to 7,000,000 cells per cu. mm. Again, the number of sperm per c.mm. is independent of the size of the testes. It is suggested that fertility in the male fowl is dependent upon the physiological efficiency of the spermatozoa rather than upon their quantitative production.

HUTT (F. B.). **Studies in Embryonic Mortality in the Fowl. I. The Frequencies of Various Malpositions of the Chick Embryo and their Significane.** *Proc. Roy. Soc. Edin.*, vol. xlix, No. 10.

An examination of 11,797 eggs which had failed to hatch revealed that there were four major malpositions of the chick embryo. Possible causes are given and it is suggested that some of the abnormal positions result from an incorrect orientation of the embryo early in cleavage.

HUTT (F. B.). **Sex Dimorphism and Variability in the Appendicular Skeleton of the Leghorn Fowl.** *Poultry Science*, vol. viii, No. 4, 1929.

A statistically significant sex-dimorphism was found in the appendicular skeletons of the Leghorn. The longer bones in the males were 13·4 per cent. greater than in females. The increase in the males was not constant for all the bones, but was highest in the tarso-metatarsus. Capons were found to be slightly larger than males in all bones except one. It is concluded that sex dimorphism results from a differential response of the soma, caused by its genetic constitution, to the different factors promoting growth.

HUTT (F. B.) and GREENWOOD (A. W.). **Studies in Embryonic Mortality in the Fowl. II. Chondrodystrophy in the Chick. III. Chick Monsters in Relation to Embryonic Mortality.** *Proc. Roy. Soc., Edin.*, vol. xlix, Nos. 11 and 12, 1929.

Among 7,135 chick embryos 112 cases of chondrodystrophy were observed and it is estimated that this condition causes a mortality in different flocks of from 0·80 to 7·96 per cent. Evidence is given to show that the incidence of chondrodystrophy is in inverse proportion to the amount of sunshine and it is suggested that the cause is an hereditary physiological abnormality in the dam which operates under certain unfavourable conditions.

It was found during an examination of 11,797 eggs which had failed to hatch that monsters accounted for 3·6 per cent. of all mortality and that there was a decline in frequency of such abnormalities from February to March. Some evidence was found to suggest the possibility of an hereditary tendency to produce monsters.

MILLER (W. C.). **Disease Resistance.** (Opening discussion on Professor Crew's paper at the National Veterinary Medical Association Congress, Newcastle-on-Tyne). *Vet. Rec.*, Oct. 13, 1928.

PICKARD (J. N.) and CREW (F. A. E.). **Scientific Aspects of Rabbit Breeding.** *Watmoughs, Ltd., Idle*, 1929.

A book of a semi-popular nature dealing with the genetics, sex-physiology and husbandry of the rabbit with particular reference to the scientific methods of producing new breeds.

PICKARD (J. N.). **Inheritance in the Rabbit.** *British Fur Rabbit Soc. Y. B.*, 1928.

A brief review of genetical knowledge of the rabbit.

PICKARD (J. N.). **A Case of Intersexuality Associated with Dichotomy of the Caudal Region in the Rabbit.** *Vet. Journ.*, vol. lxxxiv, No. 1, 1928.

An anatomical report of an abnormal rabbit.

PICKARD (J. N.). **Cases of Prolonged Gestation, Superfoetation and Abnormal Pseudopregnancy in the Rabbit.** *Vet. Journ.*, vol. lxxxiv, No. 9, 1928.

A review of various cases of these abnormalities reported to the writer.

PICKARD (J. N.). **Notes on Reproduction in the Rabbit.** *Brit. Fur Rabbit Soc. Y. B.*, 1928.

A brief review of present-day knowledge of this subject.

ROBERTS (J. A. F.) and GREENWOOD (A. W.). **An Extreme Free-martin-like Condition in the Sheep.** *Journ. Anat.*, vol. lxiii, pt. 1, 1928.

A sheep intersex is described, the anatomy of which is precisely similar to the bovine free-martin which is also described. It is suggested that there is evidence to support the view that developmental mammalian intersexes are genetic males and criteria for the recognition of the genetic sex of such abnormal cases are further suggested.

Smith (A. D. Buchanan). **Inbreeding in Jersey Cattle. The Possibility of Yield and Quality of Milk being Inherited in a Sex-linked Manner.** *Brit. Assoc. Adv. Sci.*, No. 22, 1928.

In English Jersey cattle, cows giving over 1,000 gallons in one lactation are found to be less inbred than the average of the breed. A possible reason for this may be that milk in quantity and quality may be inherited in a partly sex-linked manner. In support of this hypothesis figures are quoted from Gowen to show that the contribution of the paternal grandsire is significantly less than that of the other three parents.

Smith (A. D. Buchanan). **Live Stock Improvement and the Scrub Bull.** *Scott. Journ. Agric.*, vol. xi, No. 4, 1928.

An argument in favour of the suppression of the scrub bull.

Smith (A. D. Buchanan). **Live Stock Improvement, Past, Present and Future.** *Journ. Land Agents' Soc.*, 1929.

A review of the advancement in livestock breeding methods from the days of Bakewell of Dishley, with a criticism of those obtaining at present and suggestions as to their improvement.

Smith (A. D. Buchanan) and Asdell (S. A.). **Inheritance of Colour, Beard, Tassels and Horns in the Goat.** *Journ. Hered.*, vol. xix, No. 9, 1929.

An attempt is made to place goat colours in an ordered series showing which colours are dominant and which recessive. The beard is shown to be a case of sex-limitation, dominant in the males, recessive in the females. Tassels appear to be due to a single dominant factor in most cases and the polled condition appears to be dominant to the horned.

Voge (C. I. B.). **A Simple Chemical Test for Pregnancy.** *Brit. Med. Journ.*, Nov. 2, 1929.

It is well known that the injection of immature mice with the urine of pregnant women leads to sexual maturity. Similarly, if part of the anterior lobe of the pituitary be implanted in a similar animal the same phenomena are observed. It was thought feasible to test the urine of pregnant women for such chemical compounds as are associated with the pituitary (Histidine, Histamine, etc.). They are shown to be present in the urine of pregnant women.

Voge (C. I. B.). **Chemical Methods Applied to the Determination of Sex.** *Edin. Med. Journ.*, July, 1929.

Manoiloff attempted to show that sex could be determined by a chemical reaction—his work is discussed and it is shown that such a test is dependent in actual fact upon the increased protein content of female serum as compared with that of the male, and is not, as the author suggested, dependent upon the presence of sex hormones or enzymes; and so such a test may be used as a reflection of metabolic rate.

Wiesner (B. P.) and Patel (J. S.). **The Beta-Hormone.** *Nature.* March 23rd, 1929.

Uber das Beta-Hormon (Deciduafactor). *Klin. Wschr.* (*In the press.*)

These papers refer to the method of extraction which renders solutions of the hormone responsible for pregnancy and for pseudopregnancy and to the tests used for the biological efficacy of these solutions.

Wiesner (B. P.). **Pseudopregnancy and its Mechanism.** *Edin. Med. Journ.*, July, 1929.

The paper shows that false pregnancy is not a freak among natural phenomena, but occurs in every female individual of every mammalian species. Moreover, it is of fundamental importance since it makes the preparation for pregnancy independent of the egg. The pseudopregnant and pregnant condition is created by a secretion elaborated in the ovary in the yellow body.

(N) ANIMAL NUTRITION.

ANIMAL NUTRITION RESEARCH INSTITUTE, CAMBRIDGE.

DEIGHTON (T.). **A Study of the Metabolism of two Breeds of Pig, with some Remarks on a Third.** *Journ. Agric. Sci.*, vol. xix, 140–184.

The metabolism of a Berkshire and a Middle White pig has been investigated by means of the calorimeter at the School of Agriculture, Cambridge. The general routine has been as heretofore.

Measurements of the fasting katabolism of each of the two pigs have been obtained in a series extending from an early age to maturity, and the phenomena in general follow the lines of those originally discovered in the Large White; but the fasting katabolism of the Middle White Pig was below that of the Large White earlier studied.

The fall in body temperature and in metabolism during the fasts were found to be correlated and the possible effects of skin in causing a larger fall in the black pig are considered.

The effect of the surrounding temperature is investigated and reasons are given for supposing that the critical temperature of the Middle White Pig is very low.

It is concluded that the existence of a maximum somewhere in the curves showing fasting katabolism per unit area at different ages is necessitated by the two physiological facts (*a*) that warm-blooded animals have to be maintained at a temperature which varies only within very narrow limits and (*b*) that the processes of growth are accompanied by waste of energy as heat.

The fasting katabolism per unit area in pigs is shown to be greater than in several other animals, including man, and this is ascribed to the absence of an insulating coat.

Thermic energy is discussed in relation to the actual specific dynamic action manifested on various rations in the calorimeters and to the energy expended by the animal in muscular effort during the course of experiment. It is shown that there is during youth a reciprocal interchange between some of the energy devoted to muscular movement and that which is wasted as heat; the effect is provisionally ascribed in part to the animal being less restful on a lower plane of nutrition and partly to a possible preferential demand for blood O_2 on the part of the processes of recovery of potential energy in the muscle, over that of the growth processes.

When room has been found for the above facts in current theory it is shown to be difficult or impossible to determine a maintenance ration with precision for a single animal. A modification is suggested in the sense that the distinction between specific dynamic action and change of nutritive plane is to be abandoned, the two being combined. This is shown to fit in well with the results of independent investigation on specific dynamic action and, at the same time, allows of the computation of maintenance rations for the pigs in question living a normal life in a pen.

Reasons are given for thinking that the differences observed are for the present to be regarded as peculiar to the breeds of pig rather than to individual differences between the animals.

HALNAN (E. T.). **Digestibility trials with poultry. IV. The Digestibility of certain varieties of Oats. V. The Digestibility and feeding value of bulrush-millet.** *Journ. Agric. Sci.*, vol. xviii, pp. 634–641.

Digestibility trials with three varieties of oats, Grey Winter, Black Bountiful, and Scotch Potato, showed distinct varietal differences in digestibility of the food nutrients. These differences in digestibility appeared to be

linked with the fibre content of the grain, a high fibre content being associated with a low relative digestibility. On the basis of the figures obtained in the trials, on a 12 per cent. moisture basis 100 lb. of each variety gave the following amounts of digestible organic matter:—Grey Winter 58·3 lb., Black Bountiful 53·5 lb., Scotch Potato 47·7 lb. Oats do not appear to be very palatable to poultry.

Palatability tests with bulrush millet (*Pennesetum typhoideum*) showed that this grain of Empire origin is in every way suitable as a food grain for poultry in all stages of growth. Digestibility trials further showed that this grain is easily digested by poultry, and on a digestibility and composition basis bulrush millet appeared to approximate in feeding value to Little Joss Wheat.

HALNAN (E. T.). **Digestibility trials with poultry. VI. On the influence of the size of a ration upon its digestibility.** *Journ. Agric. Sci.*, vol. xviii, pp. 766–771.

Four White Leghorn cockerels were fed with widely varying quantities of a Sussex ground oats milk mixture and tests were carried out to ascertain whether the size of the ration affected the digestibility of the food nutrients. The amounts daily fed were 50 grms., 100 grms., and 150 grms. in the separate periods. The results obtained indicated that the digestibility of the food nutrients of a ration is not affected by the size of the ration, *i.e.*, a large ration is digested with the same efficiency as a small ration.

HALNAN (E. T.). **On the Application of Science to the Feeding of Laying Birds.** *N.U.P.S. Y. B.*, 1929.

The article gives an estimate of the maintenance and production requirements of laying birds, based on such scientific data as are available for this purpose. Tables are given showing the maintenance requirements of birds varying in weight from 3 to 8 lb. and the production requirements for the production of a 2 oz. egg. A table is also given showing the gross composition and digestibility values of the commoner feeding stuffs in use for poultry. An example is given showing the way the tables can be used for constructing an egg laying ration for birds at any given level of production.

HAMMOND (J.). **How Feeding affects Conformation.** *Farmer and Stockbreeder and Agric. Gaz.*, Dec. 10, 1928.

After showing how the changes in the properties of the body as the animal grows up are brought about, the changes produced by underfeeding or "storing," which fall heaviest on the more valuable parts of the body, are discussed. The type of feeding in a district has a natural tendency to shape the breed in that district; consequently improvements in breeding should go hand in hand with improvements in feeding.

WOOD (the late T. B.). **Recent Developments in the Feeding of Milch Cows.** *Journ. B. D. F. A.*, vol. xl, April, 1929.

A semi popular article giving the bearing of recent nutritional research on feeding cows.

WOODMAN (H. E.) and STEWART (J.). **The Mechanism of Cellulose Digestion in the Ruminant Organism. II. The Transformation of Cellulose in Glucose by the Agency of Cellulose Splitting Bacteria.** *Journ. Agric. Sci.*, xviii, 713, 1928.

The writers demonstrate the conversion of cellulose into glucose by controlling the activity of artificial cultures of cellulose-splitting bacteria in contact with filter paper. The result is held to support their theory

that there is a parallel between the digestion of starch and of cellulose in the ruminant organism, the main changes suffered by these constituents being as follows:—

Enzyme digestion:
Starch—maltose (glucose—*a*—glucoside)—glucose.
Bacterial digestion:
Cellulose—cellobiose (glucose—*b*—glucoside)—glucose.

WOODMAN (H. E.). **Trials of Grass Cake.** *Farm Notes*, vol. ii, No. 4, 17, 1928.

Experiments are described relating to the drying and pressing of young grass. It is shown (*a*) that the artificial drying at 100° of young grass does not impair the high nutritive properties of the fresh grass; (*b*) that dried grass cakes can be used as a substitute for oil cakes in the rations of dairy cows and fattening bullocks.

WOODMAN (H. E.). **Recent Advances in Animal Nutrition.** *Sci. Prog.*, No. 91, 1929, p. 432.

(*a*) Evaluation of feeding stuffs for milk and fat production in the animal.
(*b*) The nutritive value of sugar beet by-products.
(*c*) The food requirements of farm animals.

NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING, READING.

BLISSETT (A. H.) and GOLDING (J.). **Some Preliminary Experiments on the value of small quantities of Whole Cows' Milk when fed to Pigs.** *Journ. Agric. Sci.*, xviii, pt. iv, 642–8, Oct., 1928.

Preliminary experiments are reported, in all of which marked differences were observed when half a pint of milk was fed in addition to well-balanced rations.

As in the case of work carried out on behalf of the Medical Research Council on the addition of a small quantity of milk per day to the diet of growing boys, the milk appeared to supply some extra factor or factors.

The total dry matter consumed per lb. increase in live weight was diminished by the milk feeding. This supports Woodman's contention that "milk may have a specific action in increasing the extent to which a given foodstuff is digested." Half a pint of milk per pig per day seems to be a suitable minimum quantity to give to porkers.

NATIONAL INSTITUTE OF POULTRY HUSBANDRY

(Harper Adams Agricultural College),

NEWPORT, SALOP.

BOBBY (F. C.). **The All-Mash Method of Feeding.** *Journ. Min. Agric.*, Jan., 1929.

Results of two years' comparisons between the all-mash and the scratch and dry-mash systems of feeding chicks are given. Satisfactory results were obtained on the whole with the all-mash system. The simple all-mash system seems to have an advantage, especially where a large number of pullets are being reared. Tests are being made to see if pullets on the all-mash method will stand the strain of heavy egg-production.

LOMAX (E. B.). **Some Sources of Vitamin D for Growing Chicks.** *Harper Adams Utility Poultry Journal,* vol. xiv, No. 10, July 1929.

A review of some of the literature dealing with the effect of Vitamin D supply to chickens both in the form of light and as cod liver oil is given. A report is given of a comparison of two glass substitutes, Vitaglass and Cellophane, with ordinary window glass. The chicks behind Vitaglass made better growth and maintained better health during a ten weeks' period than those confined behind Cellophane or window glass. The use of Cellophane did not give sufficiently good results to justify its use.

LOMAX (E. B.). **A Study of the Comparison of Barley and Wheat as Constituents of the Scratch Grain.** *Harper Adams Utility Poultry Journal,* vol. xiv, No. 2, 1929.

A scratch ration of equal weights of barley, oats, and cracked maize was used with a basal mash to compare with another scratch ration made up of two parts by weight of wheat, one part oats and one part of cracked maize fed with the same mash mixture. A statistical analysis of the data shows no significant difference between the two pens in percentage egg production or egg size, and as far as the investigation is concerned little or no difference existed between the value of the barley and wheat as constituents of the scratch grain.

PARKHURST (RAYMOND T.) and MACFADZEAN (DOROTHY). **Cod Liver Oil for Laying Hens.** *Harper Adams Utility Poultry Journal,* vol. xiv, No. 10, July, 1929.

A review is given of some of the recent experimental work with cod liver oil and other sources of Vitamin D for adult fowls, including the work at the National Institute of Poultry Husbandry up to 1928. The results of further experiments during 1928–1928 are reported, and the conclusions are that fowls not confined or in open-fronted houses do not require cod liver oil to prevent adult rickets. Cod liver oil to the extent of 2 per cent. of the scratch feed (about 1 per cent. of the total ration) proved adequate to supply the Vitamin D requirements of the fowls.

PIG FEEDING EXPERIMENTAL STATION

(Harper Adams Agricultural College),

NEWPORT, SALOP.,

FULLERTON (J.). **On the Value of Tapioca Meal as Food for Pigs.** *Journ. Min. Agric.,* xxxvi, 130, May, 1929.

Tapioca meal used to the extent of 25 per cent. of the total ration proved fully equal to maize meal in the promotion of liveweight increase and superior to it in its influence on bacon quality and the cost of production.

CROWTHER (CHARLES). **The Work of the Harper Adams Pig Feeding Experimental Station,** 1927 **and** 1928. *Pig Breed. Ann.,* 1929–30. pp. 39–43.

ROWETT RESEARCH INSTITUTE, ABERDEEN.

MOIR (M.), NEWBIGIN (H.) and Others. **The Nutritive Requirements of Poultry. VII. Growth in Chickens, II.** *Scott. Journ. Agric.* xii, No. 3, July, 1929.

As a result of further joint poultry work with the Scottish Colleges of Agriculture and with the Ministry of Agriculture, Northern Ireland, it has

again been shown that separated milk is a valuable and economic addition to a cereal ration. The rate of growth in chickens with separated milk as a supplement was equal to that with whole milk as an addition. Other forms of milk, including semi-solid and dried milks gave slower rates of growth. Better results were obtained with separated milk than with fish meal.

GODDEN (W.). **Notes on Certain Edible Earths and Native Soils from Nigeria.** *W. Afric. Med. Journ.*

Animals on deficient diets often develop "pica" or depraved appetite and consume extraneous matter such as decaying bones and earth in an endeavour to augment the supply of whatever is deficient in the food. Natural salt licks or edible earths occur in various parts of the world which are consumed in large amounts by animals, and it is now a common practice to drive the animals to these licks periodically. Samples of such edible earths from Nigeria have been analysed and are shown to be rich in certain mineral elements.

ORR (J. B.). **The Relation of the Chemical Composition of Pasture to its Feeding Value.** *Trans. Highl. and Agric. Soc.*, 1929.

This is a review article giving a summary of the work on pastures carried out at the Institute for the past 5 years. The importance of the mineral content of pasture is shown in assessing its nutritive value. Typical examples are given showing the difference in composition between good and poor pastures. Various factors affecting the composition of pastures are discussed, such as climatic conditions, nature of the soil and the effect of fertilisers. The effects of deficiencies of mineral matter in the pastures on the health and rate of growth of animals are also dealt with.

ORR (J. B.). **The Calcium and Phosphorus Requirements of Farm Animals and the Effects of Deficiencies.** *Veterinary Congress*, 1929.

A review article dealing with the requirements of different types of farm animal for various mineral elements. Factors affecting the assimilation of mineral matter, such as irradiation and the feeding of cod liver oil, are discussed. The paper also deals with the effect of deficiency of mineral matter in the food on health, rate of growth and reproduction.

ORR (J. B.), CRICHTON (A.) and others. **Milk Substitutes in the Rearing of Calves.** *Scott. Journ. Agric.* xii, No. 2, April, 1929.

Results are given of experiments on improved methods of calf rearing. It is shown that the addition of a suitable supplement of proteins and mineral matter improves the ordinary calf-rearing ration. By this means it has been found to be possible to reduce substantially the amount of milk required in the early stages of calf rearing. The maximum beneficial effect of this supplement was noted in the case of animals grazing on poor pasture or fed indoors. In the case of animals on good pasture little effect of the supplement was noted.

ANIMAL BREEDING RESEARCH DEPARTMENT, EDINBURGH UNIVERSITY.

PICKARD (J. N.). **The Observed Effects of the Addition of Cod Liver Oil and Minerals on the Wool Yield of Angora Rabbits.** *Harper Adams Journ.*, vol. xiv, No. 9, 1929.

The addition of three drops of cod liver oil in six days each week to the diet of an Angora rabbit was found to increase the wool production by 13 per cent.

The addition of calcium lactate or of two proprietary mineral mixtures did not result in greater wool yield.

PICKARD (J. N.). **The Influence of Certain Foods on the Wool Growth of Angora Rabbits.** *Scott. Journ. Agric.*, vol. xi, No. 3, 1928.

Mineral salts were found to have a deleterious effect, while cod liver oil slightly promoted growth and yield.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

ROBERTSON (G. S.) and BASKETT (R. G.). **The Feeding of Poultry.** *Journ. Min. Agric., N. Ireland*, vol. ii, 1929.

Details are given of the results of two feeding experiments. The data recorded demonstrate the importance of inorganic supplements in the nutrition of the laying hen, and show that unlimited supplies of oyster shell and grit and grass runs do not provide adequate amounts of mineral material for the laying bird. A mash of mixed cereals alone is not sufficient for the needs of heavy producers. The addition of 2 per cent. of a mineral mixture to a cereal mash increased egg production and weight of eggs, and improved the condition of the birds. It also brought about a better utilisation of the feeding value of the mash. The addition of a protein rich food to the mash further increased the number of eggs.

Extracted Soya bean meal supplemented with a mineral mixture provided an efficient substitute for fish meal.

(O) DAIRYING.

NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING, READING.

BARKWORTH (H.), MEANWELL (L. J.) and TAYLOR (M. G. D.). **Bacterial Content and the Keeping Quality of Milk.** *Journ. Min. Agric.*, xxxvi, 2, 170–3, May, 1929.

This paper discusses the results of the examination of 4,876 samples of milk examined during clean milk competitions. It is shown that, when samples containing no coliform organisms are classified in groups based on the bacteriological content, the keeping quality (determined at 60° F.) steadily declines as the count increases, *i.e.*, the general correlation between count and keeping quality is evident.

When coliform organisms are present, it is shown that the average keeping quality is less than when they are absent. This relationship holds generally whatever the actual count may be.

BARTLETT (S.). **Breeding Records for a Dairy Herd.** *Journ. Min. Agric.*, 35, 637–43, October, 1928.

This article discusses the advantages of keeping systematic breeding registers for a dairy herd, and also some points for consideration when choosing the type of register to be kept.

The items which may be recorded are classified under five heads :—

1. Records of ancestry in which a short extended pedigree is recommended in addition to the usual method.
2. Progeny records, including remarks regarding systems of naming calves.
3. Milk records.
4. Records of type, for which photographs and a simple score card are suggested.
5. General information, such as dates of service, tests for such diseases as tuberculosis and abortion, and reasons for the disposal of the animal.

A specimen of a herd record book which has been found in practice to be highly satisfactory is included.

BARTLETT (S.). **Studies in Milk Secretion based on the Variations and Yields of Milk, and Butter Fat produced at Morning and Evening Milkings.** *Journ. Agric. Sci.*, xix, 1, 36–47, Jan., 1929.

Material is presented which shows month by month the lactation yields of cows in respect of milk and fat. Morning and evening yields are treated separately and differences in relative proportions found.

Smaller proportions of milk and of fat at the morning milkings are yielded in early lactation by all cows, but this point is most pronounced in heifers and also in heavy yielding cows with relatively small udders. It is suggested that with such animals reabsorption of milk occurs during a long night interval.

Seasonal variations in yield of milk and fat are shown. It is found that the morning milking does not respond as much as the evening milking to the stimulus to secretion which functions during May and June.

The quality of milk at different seasons of the year is discussed.

BARTLETT (S.). **Normal Day to Day Variability of Yield of Milk and Fat of Individual Cows.** *Journ. Agric. Sci.*, xix, pt. iii, 438–51, July, 1929.

Two of the many factors affecting variability are stage of lactation and season of the year. Variability is high during the first month of lactation but fairly constant after this. In the herd in question variability is highest during the month of May and tends to be higher during the summer than the winter months.

A method is presented of calculating the variability in the yield of mixed milk from a herd of cows and the error to be expected when milk records and fat percentages of individual cows are calculated from a few samples.

When cows are milked twice daily at unequal intervals the yield of milk obtained in 24 hours is slightly less variable if a morning milk yield is added to the subsequent evening yield, than if an evening yield is added to the subsequent morning yield.

MACKINTOSH (J.). **Grading Up Dairy Shorthorns to Pedigree Standard.** *Hampshire Milk Recording Society Yearbook*, 1928.

The scheme of registration of the Dairy Shorthorn Association is described, providing the means whereby many dairy farms can, in the course of time, own a herd of pedigree dairy cows without any change in the routine of good herd management and without any extra expenditure beyond that involved in the membership of a county Milk Recording Society, membership of the Dairy Shorthorn Association and the Shorthorn Society of Great Britain and the purchase of reasonably good pedigree Dairy Shorthorn bulls.

MACKINTOSH (J.). **Milk Recording.** *Journ. B. D. F. A.*, 41, 64–79, 1929.

This article gives an account of the progress of milk recording amongst the dairy farmers of this country, discusses some of the problems which have arisen, and considers and outlines the developments which are still necessary in order that dairy farmers may gain the greatest possible benefits from this part of herd management.

MATTICK (E. C. V.) and HALLETT (H. S.). **The Effect of Heat on Milk. (A) On the Coagulability by Rennet. (B) On the Nitrogen, Phosphorus and Calcium Content.** *Journ. Agric. Sci.*, xix, pt. iii, 452–62, July, 1929.

Milk which has been heated to temperatures varying from 105–209° F. for half an hour differs from raw milk in its reaction to rennet in all cases.

There is no change in the diffusibility of the nitrogenous substances in milk after heating to temperatures varying from 105–209° F. for half an hour.

Heating to 175° F. and above for half an hour appears to reduce the diffusibility of the phosphorus content of milk.

Heating to 125° F. and above for half an hour causes marked diminution in the diffusibility of the calcium content of milk.

WILLIAMS (R. STENHOUSE) and MATTICK (E. C. V.). **Raw Milk: its possible Importance to the Health of the Nation.** *Paper read before the Reading Pathological Society on Jan.* 17, 1929, *and published by that Society.* Also in *Dairyman*, 51, 9, 493–6, May, 1929.

This paper traces the growth of the interest in improved milk production. Tables are given showing the increase in the production of graded milk. The nutritive value of milk is then considered, the work of British and American

workers is described and attention is drawn to the fact that no sufficiently extensive experiments on the food value of fresh unheated milk have ever been carried out.

ANIMAL BREEDING RESEARCH DEPARTMENT, EDINBURGH.

Voge (C. I. B.). **The Agglutinating Action of Human Blood Serum upon** *B. abortus* **(Bang).** *Edin. Med. Journ.*, April, 1929.

The literature dealing with infection of the milk supply with *B. abortus*, and consequent possible infection of man and demonstration of antibodies in human serum, is discussed.

HANNAH DAIRY RESEARCH INSTITUTE, AYR.

Macneilage (A., junior). **Surplus Milk and Milk Residues.** *Bulletin No. 1 of the Institute*, 1929.

Wright (N. C.) and Papish (J.). **The Inorganic Constituents of Milk.** *Science, Jan.* 18, 1929.

Wright (N. C.). **Membrane Equilibria and Selective Absorption.** *Biochem. Journ.*, vol. xxiii, p. 352, 1929.

Wright, N. C. **Recent Advances in Dairy Science.** *Agric. Prog.*, vol. vi, 1929.

Wright, (N. C.). **The Incidence of Tuberculous Infection in the Milk Supplies of Scottish Cities.** *Brit. Med. Journ.*, Sept. 7, 1929.

ROWETT RESEARCH INSTITUTE, ABERDEEN.

Leighton (G.) and Clark (M. L.). **Milk Consumption and the Growth of School Children.** *Lancet*, No. 5497, Jan., 1929.

Results are given of repeat experiments carried out in several of the large cities in Scotland to test the value of feeding milk to school children. Similar results were obtained as in the previous experiments. There was a marked increase in the rate of growth of children receiving milk, either separated or whole, over controls or even children receiving a supply of biscuits of equal calorific value to the milk. Separated milk proved as beneficial as whole milk. There was also a distinct improvement in the physical condition of the milk fed groups.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

Thomas (S. B.) and Evans (O. J.). **The Milk Supply of Aberystwyth.** *Welsh Journ. Agric.*, vol. v., 1929.

The Borough Council of Aberystwyth organised a clean milk campaign early in 1926. This is carried on along the following lines :—

(1) Educative work amongst producers and distributors with regard to the methods necessary to secure clean milk.

(2) Stimulating a demand for clean milk amongst the public, and encouragement of local dairymen to produce and distribute graded milk.

(3) A regular bacteriological control of the milk supply. Samples examined for each vendor and producer at least twice a year. At present 1,279 samples have been examined.
(4) The water supplies of the producing farms to be examined bacteriologically.
(5) Steps have been taken to educate milk consumers as to the proper care and value of milk in the home.

Continuous work of this nature for the past four years has resulted in a considerable improvement in the hygienic quality of the milk supply of the Borough.

BRISTOL UNIVERSITY.

LING (A. W.), MACEACHARN (C. A.), and COMELY (C). **The Effect of Different Balanced Rations on the Yield and Composition of Milk from Dairy Cows.** *Uni. Bris., Bull.* No. 3.

Results of an investigation carried out during the winter and early spring of 1925–1926, and the spring of 1927 on the effects of different balanced rations on the yield and composition of milk from dairy cows are reported.

From the results obtained it appears that provided the rations are balanced from the point of view of starch equivalent and protein content and the constituents of the ration are such as not to cause digestive trouble, they will not seriously affect the yield or composition of the milk.

The data indicate also that oil to the extent of 10 per cent. can be fed in a ration without there being any depression of the butter fat in the milk.

CAMBRIDGE UNIVERSITY.

OXLEY (C. D.). **County Council of the Isle of Ely. First Clean Milk Competition, 1928–1929.** *Education Committee Report.*

Following a Foreword by Dr. C. Metcalfe Brown, Deputy County Medical Officer of Health, the first part of the Report sets out the objects, conduct and conditions of entry of the competition, together with a statement of the apportionment of marks in respect of buildings, equipment and cowshed and dairy routine.

Improvement of buildings, cleaning of cows, milking and subsequent handling of milk together with the methods of cleansing and sterilising utensils are accompanied by a brief reference to the commercial aspect of clean milk production, under the heading of Advisory Work.

The observations of the Inspecting Judge, Mr. J. H. Anderson, of the Ministry of Agriculture, are followed by the laboratory report, which includes notes on the food value of milk—particularly clean milk—the sources and nature of bacterial contamination, and the methods employed in the examination of samples.

The report concludes with a statement of marks awarded to each competitor and the names of those competitors and milkers to whom prizes and/or certificates of merit have been awarded.

Eleven herds, comprising approximately two hundred cows, under the care of some twenty-six milkers, were entered. As a result of the analysis it was found that 60 per cent. of all samples submitted were within the limits required for Grade "A" milk (not more than 200,000 bacteria per cubic centimetre and no *B. coli* present in 1/100 c.c.). The still higher standard required for "Certified" milk (not exceeding 30,000 per c.c. and no *B. coli* present in 1/10 c.c.) was reached by 49 per cent. of the samples.

In addition to the examination of samples, the advisory work and routine farm inspection were undertaken by the Dairy Bacteriologist.

MIDLAND AGRICULTURAL AND DAIRY COLLEGE.

CRANFIELD (H. T.). **The Influence of Feeding on the Composition of Milk. Mangels versus Dried Sugar Beet Pulp.** *Journ. Agric. Sci.*, vol. xix, pt. 2, Apl., 1929.

Feeding trials were carried out at two centres in Leicestershire with the object of comparing the effect on the composition of milk of feeding mangels *v.* dried sugar beet pulp in the winter ration of dairy cows. Although there were indications that the change of ration caused a slight temporary variation in the quality of milk produced, the secretion of milk solids followed, in a general way, the variation in yield. This was confirmed by the average composition figures representing the whole of the milk from each particular ration.

CRANFIELD (H. T.). **Variation in the Composition of the Milk of an Abnormal Cow.** *Journ. Agric. Sci.*, vol. xix, pt. 3, July, 1929.

This paper is a record of the composition of the milk of an abnormal cow over a period of three lactations. Although this cow was found eventually to be suffering from tuberculosis of the udder and lungs, no signs of this disease were apparent during the first two lactations, although the composition of the milk was abnormal throughout. Solids not fat, protein, lactose, insoluble ash, phosphoric acid and lime figures were all abnormally low, whilst the soluble ash figures were very high. Total ash content was normal and fat percentage very variable. Alterations in feeding had no influence on the quality of the milk. It is suggested that milk of very abnormal composition may be a sign of incipient disease affecting the organs involved in the secretion of milk.

CRANFIELD (H. T.). **Buying Milk on a Quality Basis.** *Midland Agric. Coll. Bull.*, No. 21, 1929.

In this paper a suggestion is put forward that milk should be bought and sold wholesale on a quality basis, *i.e.*, x pence per lb. of fat and y pence per lb. of solids not fat. A method is outlined whereby a depot receiving milk from various farms could sample the milk from each farm on delivery, estimate the average quality each week and pay the farmer on an agreed basis. It is argued that such a system would abolish the incentive to adulteration and moreover encourage the farmer to produce milk of high quality.

SOUTH EASTERN AGRICULTURAL COLLEGE, WYE, KENT.

BARKWORTH (H.). **Numerical Interpretation of Keeping Quality Estimations of Milk Samples (April, 1929)** *Sanit. Journ.*, vol. xxxiv, No. 9, New Series (Old Series 37th year of publication, No. 523), pp. 270–271.

A definition of keeping quality is given, being a necessary basis to any further discussion.

Three stages are distinguished: the estimation of the period of sweetness, the numerical interpretation of this period into days or hours, and the further interpretation of this second stage into marks.

Each step is discussed, and an explanation given of the present system in which keeping quality is finally adjudged in hours.

BARKWORTH (H.). **The Reductase Test (June, 1929).** *The Milk Industry*, vol. ix, No. 12, pp. 85–89.

A comparison of tests on 231 samples by the reductase test and by standard methods of the Ministry of Agriculture. Samples tested Grade I or IV by the reductase test (Orla Jensen's scale) agree well (over 80 per cent.) when reference is made to plate counts. Grades II and III are not reliable when compared with plate counts and should be combined. The count limits given by Orla Jensen are otherwise generally correct for English methods. The fermentation test is shown to be of no use as a measure of the presence of coliform organisms, and on the results available it is seen that keeping quality tests alone would grade samples into three grades with slightly less accuracy than the reductase test.

BARKWORTH (H.). **The Reductase Test (July, 1929).** *Journ. S. E. A. C.*, No. 26, 1929, pp. 217–218.

The detailed results of tests on 231 samples are given, five tests on each sample, count, coliform, keeping quality, reductase and fermentation test. The table indicates where the plate counts agree with the reductase test.

THE EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.

CUNNINGHAM (A.) **An Abnormal Aroma in Milk.** (*Read at the Meeting of Dairy Bacteriologists at Reading, Sept.*, 1929.)

The milk when fresh showed no evidence of the taint, but during the first twenty-four hours it developed an objectionable acrid odour resembling that of amyl alcohol, and became unfit for use. Affected churns always contained uncooled milk from the morning milking. From milk showing the abnormal aroma a micrococcus was isolated which was capable of producing the taint in properly controlled certified and sterilised milk. It was found that, by thoroughly cooling the morning milk immediately after milking, it was possible to suppress the development of the taint.

WEST OF SCOTLAND AGRICULTURAL COLLEGE, GLASGOW.

MCCANDLISH (A. C.). **Relationship between the Heifer's Age at First Calving and her Ultimate Production.** *The Dairy*, 40—479—340. 17th Nov. 1928. Reprint of paper presented at the World's Dairy Congress in 1928.

MCCANDLISH (A. C.). **Black Discoloration in Cheese.** *Scott. Journ. Agric.*, July, 1929.

MCCANDLISH (A. C.). **Devastating Flavour Defect in Cheese.** *Glasgow Herald*, 1st June, 1929.

MCCANDLISH (A. C.). **Acidophilus Milk.** *Scottish Co-operator.*

KAY (R. R.) and MCCANDLISH (A. C.). **Factors affecting the Yield and Quality of Milk. I. The Age of the Cow.** *Journ. Agric. Sci.*, vol. xix, pt. II, 342–372, Apl, 1929.

This paper constitutes the first of a series from a statistical study of records collected by the Scottish Milk Records Association. It was felt that before

full use could be made of the records, an investigation should be made of the variations due to the age of the animals.

Among interesting conclusions which have been drawn, the following may be cited as of considerable importance :—

With dairy cows, milk and butter-fat production increase up to about 7 years of age, and then show a decrease, which however does not mean that they deteriorate rapidly in production. This indicates that everything possible should be done towards keeping mature cows actively producing in the herd, as it is from these that the greatest production is to be obtained. The fat percentage for heifers is higher than that for older cows, but there is little change after the first lactation in the fat percentage that is of any practical significance until advanced ages are reached, when there may be a fall of importance.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

HOUSTON (J.). **Milk Recording in Northern Ireland.** *Journ. Min. Agric., N. Ireland*, vol. ii, 1929.

This paper is a statistical review of the milk recording movement in Northern Ireland up to the end of 1927. It is shown that the movement has grown steadily and that 5 per cent. of the cows in Northern Ireland are being recorded. An average increase of 524 lb. of milk and 18·81 lb. of butter-fat per cow per annum has been attained. This increase in yield has been brought about by the elimination of inferior milkers and improved methods of feeding. The annual increase in the quantity of the milk was not accompanied by a decrease in the quality of the milk. It is also shown that when the average yields of associations were grouped according to age of associations, the increase in yield per cow per annum was not uniform, being greater for second-year associations than for associations which were in existence for several years. The average butter-fat test of heifers in any year was slightly higher than that of the cows.

(P) ANIMAL PATHOLOGY.

DEPARTMENT OF ANIMAL PATHOLOGY, CAMBRIDGE.

BARRON (N. S.). **Atypical *B. pullorum* Infection in Young Chicks.** *Vet. Journ.*, vol. 85, No. 9, p. 359.

An outbreak of the disease which presented many atypical features is described. Symptoms which may assist diagnosis are discussed.

BOSWORTH (T. J.). **Multiple Necrotic Lesions in the Heart of a Cow** *Vet. Rec.*, 1929, vol. ix, No. 33, p. 696.

This is a brief description of an interesting specimen received for diagnosis together with an account of the symptoms shown by the animal.

BOSWORTH (T. J.). ***B. oedematiens* Infection in Cattle.** *Vet. Journ.* 1929, vol. 85, No. 10, p.

An outbreak of disease in a herd of young cattle involving the death of thirteen animals was found to be due to *B. oedematiens*. The article deal with the history of the outbreak, the symptoms and lesions in the affected animals, and with the properties of the causal organism. The strain in question was found to be completely non-toxigenic.

BUXTON (J. B.). **Caseous Lymphadenitis of Sheep.** *Proc. Path. Soc.*, Jan. 1929,

In this communication experimental evidence is brought forward to show that lambs and adult sheep can be readily infected with the causal organism by subcutaneous and intravenous inoculation, and by the mouth as well as through wounds and by biting insects. There is a tendency for the infection to spread and not remain localised in certain tissues and organs as has been suggested.

BUXTON (J. B.). **Tuberculin Testing.** *Vet. Rec.*, 1929, vol. ix, No. 39, p. 853.

This is a review of the more common methods of testing with tuberculin. Special reference is made to so-called anomalous results, and an explanation of some is given. The value of the double intradermal test—especially in herds which have been repeatedly tested by the subcutaneous method—is emphasised, as is also the need for a guarantee of potency of all tuberculin used for this purpose.

GLOVER (R. E.). **Contagious Pustular Dermatitis of the Sheep.** *Journ. Comp. Path. and Thera.*, 1928, Dec., vol. xli, pt. 4, p. 318.

A description is given of a condition in lambs characterised by the formation of papillomatous-like eruptions on the lips caused by a filterable virus which is abundantly present in the dried crusts from the lesions and extremely resistant to desiccation.

A method of protection against the disease by means of a glycerinised suspension of desiccated crusts is described.

GLOVER (R. E.), GLOYNE (S. R.), and GRIFFITH (A. S.). **Experiments to determine whether there is a Filterable Form of the Tubercle Bacillus.** *Journ. Path. and Bact.*, 1929, Oct., vol. xxxii., No. 4, p. 775.

In the series of experiments undertaken by Gloyne emulsions of tuberculous sputum and of foetal tissues from tuberculous women were passed through Chamberland L_3 candles and the filtrates were inoculated into guinea pigs. In the experiments of Glover and Griffith the emulsions were prepared from the tuberculous tissues of various animals and from cultures of the tubercle bacillus. Six strains of bovine, three of human and three of avian type were used. Filtration was through Chamberland L_2 or Berkefeld N candles, and the filtrates were inoculated into suitable animals—(guinea pigs, rabbits or fowls). The authors were unable to confirm the presence of a filterable form of the organism.

LEYSHON (W. J.). **An Examination of a Number of Cases of Ovine Mastitis.** *Vet. Journ.*, vol. 85, No. 7, p. 286. Also vol. 83, No. 8, p. 331.

The results of examinations of thirty-eight cases of mastitis in ewes are recorded. A brief review is given of the symptoms and course of the disease together with an account of the morbid anatomy and histology of the lesions. Several different organisms would appear to be capable of setting up the condition ; and in this series of cases staphylococci are shown to be the commonest invaders.

STEWART (J.). **Albuminuria in Sheep.** *Vet. Rec.*, 1929, vol. ix, No. 21, p. 443.

During the clinical examination of the urine of sheep on high protein feeding experiments albumin in variable amount was constantly present. The periodicity of the quantity of albumin could not be correlated with any of the other factors of the experiments. A similar observation was made in the case of normal sheep and lambs, many of which were examined. It was therefore concluded that the presence of a varying amount of albumin in sheep's urine must be regarded as a normal occurrence. When amounts as high as 1·5 per cent. are present, pathological changes in the kidneys are not necessarily indicated.

STEWART (J.). **High Protein Diet and Renal Disturbance in Young Sheep.** *Vet. Journ.*, 1929, vol. 85, No. 5, p. 209.

Experiments are described which show that an excessive amount of protein in the diet of sheep does not adversely affect the kidneys. It was therefore concluded that this factor could not be regarded as primarily responsible for the condition known as "Pulpy Kidney Disease" as had been supposed hitherto.

RESEARCH INSTITUTE IN ANIMAL PATHOLOGY, ROYAL VETERINARY COLLEGE.

MINETT (F. C.). **Streptococcic Mastitis in Bovines. Discussion on paper by Dr. O. Fettick, Hungary.** *Report of Proceedings of World's Dairy Congress, Great Britain,* 1928, p. 504.

The following points were brought out in the discussion. Emphasis was laid upon the economic importance of streptococcic mastitis. Although

no reliable statistics are available regarding incidence, it is certain that mastitis is widespread among milking cows. Occult infection is frequent and the problem of diagnosis is one upon which more research is required. The various procedures recommended for this purpose are shortly discussed. Probably the only entirely satisfactory way of making a diagnosis is by cultural examination of udder milk. There is little evidence that mastitis streptococci are a frequent cause of disease in human beings.

MINETT (F. C.). **Some Recent Advances in our Knowledge of Animal Disease.** *Essex C.F.U.Y.B.* 1929, p. 162.

This paper contains an account of some of the more important developments which have taken place in our knowledge of the diseases of farm animals during the last 25 years. Particular reference is made to foot-and-mouth disease, Johne's disease, vaccination of cattle against tuberculosis, contagious bovine abortion and its control.

MCEWEN (A. D.). **Impressions Gathered During a Tour of the United States of America.** 1929, *Vet. Rec.*, vol 9, p. 1.

This paper contains an account of the methods adopted in the United States by the Federal and State Governments working in co-operation to control disease in animals and to encourage research and education on veterinary subjects. The progress which has been made in the past few years in the eradication of tuberculosis and the control of contagious abortion in cattle receives special mention.

MCEWEN (A. D.). **How to secure disease-free herds.** *Farmer and Stockbreeder*, vol. 43 (New Series), p. 687, 1929.

A popular account of methods which should be adopted with the object of freeing our herds from some of the more important contagious diseases.

STABLEFORTH (A. W.). **A Bacteriological Investigation of Cases of Tuberculosis in Equines.** *Journ. Comp. Path. and Thera.*, vol. 42, pp. 91–108, 1929.

Strains from thirteen cases were isolated on egg directly or through a guinea-pig and if necessary subcultured a few times on plain media. The cultural characters of at least two generations on egg, broth-egg, serum, potato, agar and broth, with or without glycerine, were then examined. All were dysgonic. Inoculations with original material from two cases showed the bacilli to be fully virulent. In five cases, judging from the results of inoculations in guinea-pigs and rabbits with measured amounts of culture, the bacilli were of standard bovine virulence; in two cases the bacilli were of slightly lower virulence and in the remaining four cases of distinctly low virulence.

STABLEFORTH (A. W.). **A Bacterial Investigation of Cases of Tuberculosis in Five Cats, Sixteen Dogs, a Parrot and a Wallaby.** *Journ. Comp. Path. and Thera.*, vol. 42, 1929, pp. 163–188.

The methods were similar to those used in connection with equine material. The causal bacilli from six dogs were dysgonic and of full bovine virulence; those from ten others appeared to be of human origin in being eugonic, glycerine-liking and of low virulence for rabbits. In some cases the probable source of infection was traced. In four cats the causal bacilli were dysgonic and fully virulent; in the remaining case dysgonic but of less than standard

bovine virulence. The parrot was infected with bacilli possessing definite human characters. The bacilli from the wallaby were typically avian.

MINISTRY OF AGRICULTURE AND FISHERIES, VETERINARY LABORATORY.

Doyle (T. M.), Orr (A. B.) and Purchase (H. S.). **The Filterable Virus of Tuberculosis.** *Journ. Comp. Path. and Thera.*, June, 1929.

Six specimens of milk and three of blood, obtained from cows affected with tuberculosis, were tested by guinea-pig inoculation for the presence of the filterable virus of tuberculosis.

Acid-fast bacilli, indistinguishable from tubercle bacilli, were found in gland smears of guinea-pigs inoculated with filtrate of each specimen of milk and blood.

In one instance acid-fast bacilli, indistinguishable from tubercle bacilli, were found in gland smears of a guinea-pig inoculated with filtrate of milk from the apparently healthy udder of a cow affected with pulmonary tuberculosis.

Doyle (T. M.). **Immunisation of Bovines against Tuberculosis with B.C.G. Vaccine.** *Vet. Rec.*, March 16th, 1929.

A general discussion of the present position.

Doyle (T. M.). **Infectious Entero-Hepatitis of Turkeys.** *Journ. Min. Agric.*, July, 1929.

A semi-popular description of the disease, and of the methods recommended for its control.

Purchase (H. S.). **The Incidence of Tuberculosis in a Herd in Northern Rhodesia.** *Journ. Comp. Path. and Thera.*, 1929, vol. xlii, p. 135.

The author describes the results obtained when the subcutaneous tuberculin test was applied in North-eastern Rhodesia to a herd composed mainly of Angoni cows crossed with Hereford and Shorthorn bulls. It was surprising to find that twenty per cent. of the total number reacted, as these cattle were kept under ranching conditions. The distribution of the disease also presented peculiar features. Only thirteen per cent. of the breeding stock reacted, but the proportion was as high as twenty-six per cent. in the young stock, excluding calves under six months of age.

ROWETT RESEARCH INSTITUTE, ABERDEEN.

Magee (H. E.), Anderson (W.) and McCallum (J.). **Diet and Peptic Ulcers in Cavies.** *Lancet*, No. 5497, Jan., 1929.

Diets deficient in fat soluble vitamins and in calcium, sodium and chlorine produced ulcers, erosions and circulatory changes in the stomach, duodenum and caecum of cavies and also lesions in the adrenal glands, which were interpreted as evidence of over-stimulation or exhaustion. The results suggested a close relationship between the functions of the adrenals and of the gastro-intestinal tract.

McGowan (J. P.). **Some Aspects of the Van Den Bergh Test for Bilirubin.** *Edin. Med. Journ.*, xxxvi, No. 4, Apr., 1929.

In the performance of the Van den Bergh test for Bilirubin the bilirubin is liable to be precipitated by the acid of the reagent and so become unavailable to produce the colour effect unless there is sufficient alkali present to neutralise this acid. In this consideration would appear to lie the basis for the different results obtained in the "direct" and the "indirect" reaction. In conditions giving the latter reaction such as the anaemias, there is a diminution of the alkaline reserve of the blood and thus less alkali is available for neutralisation of the acid of the reagent. Addition of buffer mixtures by supplying the necessary alkali, changes an indirect to a direct reaction. The bilirubins giving the "direct" and the "indirect" reaction would appear therefore to be identical chemically: the difference obtained in the two reactions depends on the associated difference in alkali reserved.

ANIMAL BREEDING RESEARCH DEPARTMENT, EDINBURGH.

Voge (C. I. B.) **A Note upon the Treatment of an Injection of *B. Abortus* in Rabbits.** *Journ. Comp. Path. and Thera.*, pt. 3, Sept., 1929.

Serum euglobulin obtained from anti-abortus cow serum appears to afford protection to a rabbit subsequently infected with *B. Abortus*. Serum euglobulin from normal serum does not act in this manner although effects of infection are less drastic than where no treatment is given.

Voge (C. I. B.) **The Dialysis of small Volumes of Serum under Sterile Conditions.** *Biochem. Journ.*, vol. xxiii, No. 2, 1929.

This communication describes a simple apparatus which is made use of to obtain serum fractions so as to ascertain that fraction in which alterations occur as a result of the production of antibodies. It is shown that agglutinins are present in serum euglobulin fraction and this fact is made use of in an attempt to prevent an infection of *B. Abortus* in rabbits running its usual course.

MINISTRY OF AGRICULTURE, NORTHERN IRELAND.

Kerr (W. R.). **Neoplasms in the Fowl.** *Vet. Journ.*, 1928, vol. lxxxiv, No. 11.

A report on the incidence and nature of tumours found in the post-mortem examinations of 460 fowls.

45 tumours were encountered representing 9·78 per cent., 42 of which were internal in origin.

The tumours were classified as follows:—

Lymphoma 12, Sarcoma 9, Carcinoma 4, Adeno-carcinoma 2, Adenoma 2, Fibroma 1, Lipoma 1.

From the investigations, it would appear that lymphoma and sarcoma are the commonest tumours in the fowl.

Lamont (H. G.). **"Blows" in Pigs.** *Journ. Min. Agric. N. Ireland*, 1929, vol. ii.

A common disease of pigs not previously investigated in Northern Ireland is described under two heads: (1) "Blows" of verminous origin, (2) "Blows" of non-verminous origin.

Metastrongylus apri and *Ascaris suis* are associated with the first type.

The second form of "Blows" is the more important and causes serious losses. The investigation showed that the condition is neither infectious nor contagious and that it bears no relation to swine fever or swine plague. Available evidence points to the condition being due to anaemia.

The symptoms of both types of "Blows" are given in detail and means of differentiation stated.

LAMONT (H. G.). **Arsenical Poisoning.** *Vet. Journ.*, 1929, vol. lxxxv, No. 3.

An account of several cases of acute arsenical poisoning which occurred on a farm through the accidental contamination of the drinking water with sheep dip. The post-mortem lesions are described.

UNIVERSITY COLLEGE OF NORTH WALES, BANGOR.

MONTGOMERIE (R. F.), SAVAGE (W. H.) and DODDS (E. C.). **Tetany in Welsh Mountain Ponies.** *Vet. Rec.*, vol. ix, No. 16, pp. 319–324, Apr., 1929.

A condition met among ponies which have just completed a journey by rail, and among suckling pony mares soon after being housed, is described. On clinical grounds it was diagnosed as tetany, and analysis showed that the calcium content of the blood of the affected ponies was very low, the phosphorus and alkali reserve figures high, and that bile pigments, probably of haemolytic origin, were present. The subcutaneous, or, in the mare, intramammary injection of air produced a rapid return to normal.

The simple confinement of three pony mares produced an alteration in the blood analyses similar to, but less marked than, that seen in cases of tetany.

The subcutaneous injection of air altered the chemical composition of the blood of three mares little, if any.

The genesis of tetany in these cases is discussed.

MONTGOMERIE (R. F.). **Recent Advances towards the Control of Liver Rot of Sheep.** *Report of an Address delivered to the International Conference of the National Sheep Breeders' Association, Harrogate,* 8th July, 1929.

A review of recent work on this subject and a consideration of the application of the results obtained.

UNIVERSITY COLLEGE OF SOUTH WALES, CARDIFF.

BISSETT (N.). **Notes on the Calmette-Guerin Method of Preventive Inoculation of Calves against Tuberculosis.** *Welsh Journ. Agric.*, vol. 5, 1929.

This paper summarises the experiences of the writer when working on the above subject with Dr. Guerin at the Pasteur Institute during the summer of 1928.

The method of preparing the vaccine is discussed, as also is its administration, and the results so far obtained in France.

LIVERPOOL UNIVERSITY.

DOWNHAM (K. D.). **Tuberculosis in Cattle.** *Presented to the N. F. U., Lancaster,* 19 Dec., 1928.

In the course of this paper it was stated that the work in connection with the eradication of Bovine Tuberculosis by means of the Calmette Guerin Vaccine upon calves was being continued in Lancashire and Cheshire upon selected herds.

It was stated that the length of time that the lesion persists after vaccination varies considerably in young animals but that in most cases after twelve months there is very little alteration at the site of the injection upon palpation.

Reference was made to the fact that the general condition of the vaccinated animals appeared to be good.

DOWNHAM (K. D.). **Johne's Disease. Experimental Treatment of Cases.** *Vet. Rec.*, No. 26, vol. ix, p. 549, 29 June, 1929.

In this article the result of treatment of cases of Johne's Disease with derivatives of Chaulmoogric Oil and with other drugs is reported.

As far as this experimental treatment has gone it appears that no drug can be considered curative for this condition.

Reference was made to experimental work which has been carried out with a diagnostic agent upon affected herds. It would appear that this material is certainly an aid in efforts to eliminate Johne's Disease from a herd.

(Q) ECONOMICS.

LONG ASHTON FRUIT RESEARCH STATION, BRISTOL.

MAYNARD (J. G.). **The Economics of Spraying Fruit Trees. I. The Cost of Winter Washing—Winter, 1928–29.** *Ann. Rep. Agric. and Hort. Res. Stn., Long Ashton,* 1928.

A paper setting out and discussing winter spraying on the Long Ashton farm deals in detail with the cost of this spraying on most types of fruit. Particular attention is given to the machinery used and methods of work. Details of cost for various plantations are discussed.

AGRICULTURAL ECONOMICS RESEARCH INSTITUTE, OXFORD.

Occasional Notes. (Quarterly Periodical.)

Vol. I. No. 4. October, 1928.
Weights and Values of the Offals of Fat Stock. The Place of Sugar Beet among Farm Crops. Sugar Beet: Drilling Distances in Relation to Yield, Cost and Profit. Cost of Growing Mangolds.

,, No. 5. January, 1929.
Price Changes in 1928. Britain's Food Supplies, I. Meat. Farm Labour Requirements and the Value of Equipment. Farm Work Horses in Oxfordshire.

,, No. 6. April, 1929.
Britain's Food Supplies, II. Dairy Produce. Milk: Production and Marketing in Derbyshire. Farm Accounts: Are they worth while ? Tractor Costs, 1926/27: Oxford Province.

,, No. 7. July, 1929.
Britain's Food Supplies: III. Pig Products. The Incidence of the Depression. Sugar Beet: Drilling Date in Relation to Yield and Profit. Cattle Grazing in the Midlands. Cost of erecting Cowsheds.

BRIDGES (A.). **Survey Methods as an Approach to the Study of Agricultural Economics.** *Paper read at a Conference of the Agric. Econ. Soc., Oxford, July 7th,* 1928.

An account of the agricultural economic survey as a method of obtaining data for the problems of farm management. Farm management research must be based on a thorough study of farms and farming. In meeting the need for information, farming conditions as they exist must be known—not on a few farms only but for as wide a range of farms as possible. The survey method enables a representative picture of organisation and economic conditions of farming to be obtained and therefore offers the greatest opportunity for the improvement of farming.

BRIDGES (A.) and LEE (J. R.). **Sugar Beet Costs and Returns for the year 1927–28**, and **Preliminary Statement for the Year 1928–29.**

This report on the costs and returns from growing sugar beet, the fourth of a series issued by the Institute, contains an interesting innovation in the

shape of a section entirely devoted to a discussion of variations in the cultivation and manuring of the crop. Returns obtained from 448 growers located in all of the chief beet-growing counties in England and Wales are analysed to show not only the yields but also the actual profits which have resulted from the different treatments.

DIXEY (R. N.). **Agricultural Wages and the Future of British Farming.** *Berichte über Landwirtschaft*, 1929, p. 309, Berlin.

This article summarises the events which have led up to the present system of fixing agricultural wages in England, and reviews the situation in the light of a claim recently made by C. S. Orwin, that the setting up of statutory bodies by whom legal minimum rates of wages are fixed, introduced a new element which is likely to be the dominating factor in the future development of rural industry in England.

MAXTON (J. P.). **The Survey Method of Research in Farm Economics.** *E.M.B.* 14, *H.M. Stationery Office.*

This report, which is issued by the Agricultural Economics Committee of the Empire Marketing Board, summarizes and compares the chief methods of investigation in farm economic research, going on to show the development of the survey method and the range of knowledge obtained by it, with illustrations of typical results, and concluding with an outline of the procedure followed in this type of investigation. This method of research, by reason of its speed, comprehensiveness and flexibility, seems to warrant careful consideration, especially by Departments in agricultural areas where economic research is comparatively undeveloped.

MAXTON (J. P.). **A Guide to Agricultural Policy.** *Ruskin College Study Courses*, No. 3.

This guide is intended to meet the need for a brief comparative study of the main policies affecting agriculture submitted by the various political parties. It is arranged in sections so as to show what the action of the State is at the present time with regard to the different problems of Agriculture followed by summaries of the Party Policies, and suggestions for additional reading and discussion. At the end there is a bibliography giving not only the official publications, but other proposals which have appeared at various times, of which a student of agricultural policy should know something if he is to judge fairly the different programmes before the country to-day.

ORWIN (C. S.). **The Relative Advantages of Intensification and Extensification of Farming.** *Conference on "Recent Changes in Systems of Husbandry in Great Britain." Rothamsted Experimental Station.* No. 27, 1928.

This paper is a consideration of the possibilities of the intensification of production under economic conditions controlling the agricultural industry in Britain to-day. It is suggested that in the case of those products where the competition of prairie farmers and cultivators living more nearly at the subsistence level has to be faced, intensification of production must lead to higher unit costs. Evidence in support of this is provided by the decline in corn-growing and the increasing concentration by farmers in this country on products naturally protected by reason of their perishability, and on the luxury and semi-luxury products for which a demand exists owing to the superior economic position of the British industrial worker.

ORWIN (C. S.). **Agricultural Economics.** *Agricultural Research in* 1927. *R.A.S.E.*

This article forms one of the series of annual digests on the research work of the year published by the Royal Agricultural Society of England.

ORWIN (C. S.). **Farming.** *Monthly article in "The Manchester Guardian."*

The purpose of this series is mainly the information of the non-agricultural reader on questions relating to the organisation of the farming industry in this country, and of the economic conditions which lead to the differentiation of agriculture in England from production from the land in other countries.

ORWIN (C. S.). **Farm Management.** *Encycl. Brit., 14th edition.*

This article discusses the business organisation of agriculture as effected by the individual farmer, both as regards the production and marketing of products. It treats of the disabilities inherent in small scale production and considers the measures which have been taken to overcome them.

PREWETT (F. J.). **Progress in English Farming Systems. I. Milk Production on Arable Land.** *Clarendon Press.*

The first of a series of studies of individual farms on which a sharp departure has been made from local farming practice. The present study is concerned with a farm which, in a typical sheep and barley district, was devoted to milk production by means of a large acreage of lucerne. The financial results, covering a period of seventeen years, completely justify this departure from local practice.

PREWETT (F. J.). **General Marketing Principles.** (*N.F.U.Y.B., Berkshire Branch,* 1929.

In this paper the conditions governing agricultural marketing are described. The difficulty of combining for marketing in agriculture is shown to be greater than is the difficulty of combining in manufacturing industry, but such combination among farmers is essential in their own interests.

PREWETT (F. J.). **Milk Marketing by Pools and Otherwise.** *Conference on the "Hertfordshire Agricultural Situation" Rothamsted Experimental Station,* Jan., 1929.

The prevailing methods of marketing milk are described. In England, combination for milk marketing has taken the form of collective bargaining depending upon the loyalty of producers and distributors in honouring the agreement arrived at by their representatives in conference. In this paper it is suggested that collective bargaining must be reinforced, as it is in Scotland, by legally binding contract.

SHORT (J. B.). **The Butcher's Shop:** A Study of a Country Butcher's Business. *Clarendon Press.*

Very little is known of the operations of the retail distributor of farm produce, and even less, probably, of the consumer's preference as controlled by his economic position. This report makes a careful examination of the business of a retail butcher, his expenses and profits, and also gives a fairly complete analysis of the requirements of the various customers, classified according to their purchasing power.

MINISTRY OF AGRICULTURE AND FISHERIES.

The Marketing of Wheat, Barley and Oats in England and Wales. *Min. Agric.* (*Econ. Ser., No.* 17). Pub. H.M.S.O., price 6d. net.

The opening chapters of this comprehensive report contain a brief summary of the world-position of the international cereal trade, dealing especially with the quantity and quality of home-grown and imported supplies, analysing the extent and nature of the demand for both. Prices of cereals are discussed as to trend, seasonal and local variations, and the comparative values of supplies from different sources.

In the general body of the report, the stages in the marketing of the grain are traced from the time of threshing up to that of the distribution of the final products from the markets, whether as seed, flour, offals, etc. The practice in regard to sampling, grading, assembling and transporting grain in other countries is considered and compared with the methods in this country. There is a special chapter on the storage of grain on and off the farm, comparing again the practices in this country with those abroad. The function of corn markets and corn and produce exchanges in the sphere of distribution, and the methods adopted by farmers, merchants and agricultural co-operative societies, are described in detail, and ample references are made throughout the report to the practices followed by the farmers' pools of Canada, Australia, and elsewhere.

In order to complete the review, notes have been added on the processing and distribution of cereal products, particularly in regard to flour milling and baking, malting, and meal and provender milling.

The supply, distribution, and official control of cereal seeds are also discussed, and the functions of the seed-testing and plant-breeding stations described, while the Appendices include a description of the geographical distribution of varieties throughout the country.

The concluding chapter surveys the special marketing problems of each cereal, and draws attention to the need for unified selling, and to the necessity for more orderly marketing, and for a greater degree of quality standardisation than exists in the trade to-day.

The report is provided with ample statistical material in the form of eighteen tables, and is well illustrated.

Marketing of Cattle and Beef in England and Wales. *Min. Agric.* (*Econ. Ser., No,* 20). Pub. H.M.S.O., price 6d. net.

This report, like other commodity reports in the Economic Series, gives a comprehensive survey of a complicated industry.

The report is divided into 6 sections. A preliminary section deals with supplies, the raw material of the beef industry, and also with demand and prices. In the second section the assembling and grading of cattle are discussed both as regards store stock and fat stock. The various aspects of transportation are discussed in section 3. Section 4 deals with methods of sale, two important chapters being devoted to a consideration of possible developments in livestock marketing and to the question of public abattoirs. It is argued that centralised slaughtering is an inevitable development in the meat trade and that such centralisation will probably affect marketing methods. The fifth section contains chapters on the wholesale meat trade, the grading and marking of beef, the retail meat trade, the trade in offals an by-products, and the problem of insurance against condemnation of carcases. The main arguments of the report are summed up in the concluding section. The report is fully illustrated and outlines a far-reaching policy for the improvement of the industry.

Markets and Fairs in England and Wales. Part IV, Eastern and Southern Markets. *Min. Agric.* (*Econ. Ser., No.* 23). Pub. H.M.S.O. Price 6d. net.

This report on the 670 markets and 268 fairs of the 10 counties south and south-west of the Thames and of Buckinghamshire, Hertfordshire, Middlesex, Essex, Suffolk and Norfolk, is on lines similar to those followed in the surveys of the Midland and Northern markets (*Econ. Series,* Nos. 14 and 19, respectively). In view, however, of the fact that large wholesale meat or fruit and vegetable distributing markets are not numerous in the eastern and southern counties, the area being mainly agricultural rather than industrial, greater space has naturally been devoted to the markets in producing areas. The report is divided into three main sections: Section I surveys in general terms the Eastern and Southern markets and fairs as a whole; Section II reviews the markets of each county in relation to agricultural production, and in Section III, a number of markets have been selected for special description. The appendices to the Report form a complete guide to the markets and fairs of the area; in the case of livestock markets or fairs, the number of each class of stock normally dealt with in a year is also given.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

Ashby (A. W.) and Jones (J. Morgan). **The Co-operative Supply of Farm Requisites in Wales.** *Journ. Min. Agric.*, vol. xxxv, No. 11, Feb., 1929.

Total sales of farm requisites by societies with a membership of 23,300 amounted to £1,156,000. In groups of societies classified by amount of turnover, sales per member vary between £21 and £79. Capital has been obtained and accumulated: subscribed £197; reserves and accumulated profits £38 8s.; total "members' interest" £58 8s.; borrowed £41 5s. Higher proportions of subscribed and saved and the higher profits are found together. Heavier borrowing and higher expenses are related. Problems of management and control are discussed.

Ashby (A. W.) and Lewis (Thomas). **Beef Production: Seasonal Variations in Supplies and Prices of Fat Cattle.** *Welsh Journ. Agric.*, vol. 5, 1929.

Deals with production and prices of beef in England and Wales. Contains five tables and nine diagrams. Since 1913 changes have occurred in production with consequent changes in the incidence of market supplies. A "spring peak" in supplies has disappeared and an abnormally high supply has been on the autumn markets, with consequent slump in prices. The low prices prevailing in autumn have been due to a glut of home-produced beef; imports of "chilled" which are heavier than the normal monthly quantities; increase in pork offers and purchases; the arrival of game on the market and supplies of poultry at lower prices.

Ashby (A. W.) and Davies (J. Llefelys). **The Work Efficiency of Farm Organisation in Wales, 1871–1921.** *Welsh Journ. Agric.*, vol. 5, 1929.

Changes in supply and costs of labour with competition of other industries for labour supply are the chief causes of changes in farm labour organisation, There were differences in efficiency between North and South Wales in 1871 amounting to about 8 per cent. in favour of South Wales. During the period South Wales made slightly greater progress, and the difference in 1921 was about 14 per cent. The increase in work efficiency of the average farm

organisation in Wales between 1871 and 1921 was 37–38 per cent. ; in South Wales 43–47 and in North Wales 35–38 per cent.

LEWIS (Thomas). **The Marketing of Cattle in Wales (with special reference to North Wales).** *Welsh Journ. Agric.*, Vol. 5, 1929.

Surveys agricultural conditions in relation to stock markets. Three classes of dealers buy the greater part of the stock which is moved to England. Dealers are too numerous, and the system is unsatisfactory and expensive. Auction marts are small and often duplicate selling agencies. The selling position of farmers is weak, for they have comparatively little knowledge of trade conditions and prices. Suggestions for the improvement of cattle marketing: elimination of small markets; universal use of weighbridge for fat cattle; grading and quotation of prices by grade; better market reporting and for some conditions the organisation of livestock marketing societies.

ARMSTRONG COLLEGE, NEWCASTLE-ON-TYNE.

DINSDALE (D. H.) and MCCLYMONT (R. G.). **Three Years of Sugar Beet Growing in Northumberland and Durham,** 15 pp. *Armstrong College, Newcastle-on-Tyne.*

This bulletin summarises the results of inquiries made in relation to three successive crops of sugar beet in the counties concerned and is a continuation of a similar report published in 1927.

An outline of the national position is given, with extracts from Oxford and Cambridge investigations, in order to provide the background to the local situation.

Summaries of the data collected, dealing with Costs and Returns, are given for groups of farms in the two countries for the three years. The conclusions arrived at are that, apart from the first year (1926), the Sugar Beet crop failed to yield a cash return sufficient to cover the direct costs involved in growing it, and this must be regarded as the main cause of the lack of enthusiasm for the crop amongst farmers.

No correlation between the manurial costs and the yield in tonnage or in cash could be detected. Transport costs represent a heavy burden owing to the remoteness of factories and, as the grower's price falls with the reduction in subsidy, this item of cost will become proportionately heavier.

Generally, the sugar beet problem in these counties is regarded as an agricultural one, inasmuch as the tonnage yields obtained offered no hope of economic returns, and until there is greater assurance of adequate crops, the waning of interest which occurred in 1927 and 1928 is likely to continue.

CAMBRIDGE UNIVERSITY.

CARSLAW (R. McG.) and KIRKPATRICK (W. H.). **An Economic and Financial Analysis of Five Eastern Counties Farms in 1927–28.** *Report No.* 11. *Price* 1*s. net, postage* 1*d.*

This publication is of a similar nature to Report No. 10, the principal difference being that whereas the latter reviews the activities of certain farms for the year ending at Michaelmas, 1927, the former deals with the financial year ending at Lady-day, 1928. One important point arising from this difference is that, while in the Michaelmas farms Report the financial year and the cereal year do not coincide, in the Lady-day farms report these two time standards correspond closely. The results achieved by the five farms

reviewed in Report No. 11 are very similar to those recorded in Report No. 10 in so far as the net return to the occupier is lower than that obtained in any one of the previous three years. As in the previous issues of this series, there is weighty evidence to show that the losses are attributable mainly to the livestock departments.

CARSLAW (R. McG.). **Four Years' Farming in East Anglia, 1923–1927.** *Report No.* 12. *Price* 3*s. net* (*paper cover*), 5*s. net* (*cloth cover*) *postage* 3*d.*

This publication summarises and amplifies the results of various economic investigations carried out by the Farm Economics Branch since 1923, for which preliminary information was given in the *interim* reports Nos. 1 to 11. The volume comprises more than 130 pages, contains 5 diagrams and 32 tables, and provides a comprehensive review of the numerous factors connected with arable farming. "The relationship between the different departments comprising the unit of management representing the mixed arable farm is such that it is in many cases difficult, and in some cases dangerous, to attempt to dissociate the part from the whole. An endeavour has been made, however, to display the economic significance of the various branches *in relation* to the farming unit, and to present a survey view of the whole complex structure."

The data given are based on a detailed investigation of the costs and returns on 26 farms distributed throughout the Province. Two methods of grouping the results are used, viz.: (1) a size grouping, in which the economy of farms below 120 acres in size is compared with that of larger holdings, and (2) a soil grouping, in which the economy of those farms situated on the heavier types of soil is compared with that of the farms situated on the lighter types. Complete cost data are given for fourteen different crops and the various classes of livestock, while additional Tables give the economic and statistical information of distribution of cropping, distribution of capital expenditure and receipts, employment statistics, net output, private drawings and profits and losses. Throughout all the analyses the heavier soil holdings are seen to be at a disadvantage as compared with the lighter soil farms; a disadvantage which culminates in the former realising a net profit only half as great as that gained by the latter. A comparison of the results achieved by the larger and smaller sized undertakings shows that, when allowance is made for the family labour factor, the latter class possesses little advantage over the former.

Such subsidiary information as the incidence of overhead charges, the cost of tractor work, the cost of farmyard manure, and the cost of bare fallows receives considerable attention. An interesting section compares the returns from (*a*) feeding cattle, (*b*) wholesale milk and (*c*) retail milk, the result being a loss of 20 per cent. on (*a*), a loss of 1 per cent. on (*b*), and a profit of 20 per cent. on (*c*). The returns from pigs over the four years reviewed show losses in 1924 and 1927, and profits in the two intermediate years. The last chapter reviews the distribution of the soil types throughout the Province, the movement of prices during the four years concerned, and the profits and losses on the various departments generally associated with arable farming in the eastern counties.

VENN (J. A.). **The Incidence of Taxation in Agriculture.** *Communicated to the Glasgow Meeting of the British Association by J. A. Venn, M.A., Fellow of Queens' College, Gilbey Lecturer and Advisory Economist.*

What are popularly referred to as the "Burdens" on British Agriculture are four in number, viz.: Tithe, Land-Tax, Rates and Income Tax. Peculiar in origin and in their economic characteristics, the two first affect the owners

of land; Rates nominally falling on tenants, are, in varying degree, transferred to landlords, who also contribute the bulk of the Income Tax derived from the industry. All have been progressively modified, but Tithe and Land Tax, although redeemable, are very uneven and arbitrary in incidence. Each Royal Commission appointed during the last century advocated remission of taxation to agriculturists and, accordingly, every period of depression has witnessed Statutory action. In 1896, and in 1923, rates on agricultural land were halved, in 1929 they are to disappear; Land-Tax has been reduced from a maximum of 4s. to 1s. in the pound; Tithe has been stabilised (perhaps without due consideration of possible future money values) at £105; Income Tax grants unique privileges to the occupiers of agricultural land. Nevertheless, each generation of farmers, supported by the Press, continues to protest against the weight of taxation borne by the industry. Analysis shows, however, that even in the past, the position was considerably exaggerated.

PERCENTAGE OF TOTAL OUTGOINGS.

Years.	*Tithe.*	*Rates and Taxes.*	*All "Burdens."*
1839–43	6·1	3·9	10·0
1863–7	4·2	2·4	6·6
1871–5	3·4	1·3	4·7
1890–3	3·2	1·3	4·5

Rates on agricultural land in England, which averaged 2s. 2d. to 2s. 6d. per acre in the 'eighties and 'nineties, still stood at under 3s. immediately after the war and little above that figure in 1927–28. The present level is equivalent to £10 per "farm," or £13 13s. per "farmer," and represents less than two per cent. of the outgoings of the majority of holdings. Thus it costs from £8 to £10 to produce an acre of cereals, of which 30s. to £2 is accounted for by Labour, 30s. by Rent, and 2s. to 4s. by Rates.

LEEDS UNIVERSITY.

RUSTON (A. G.) **East Riding Farming and its Marketing Problems.** *East Riding N.F.U. Record*, vol. vi., Nos. 5, 6 and 7.

Geologically the East Riding may be divided into three types :—

(*a*) The Wolds—long ranges of chalk which slope down abruptly to the surrounding plains. On this chalky land, barley is the most important white crop, and its fertility depends upon the "golden hoof" of the sheep.

(*b*) To the East of the Wolds are the heavy Boulder clays of the Holderness area, excellent bean and wheat land, with the grassland in the area rich and strong; most of the wheat grown either after seeds or a bare fallow.

(*c*) To the West of the Wolds, runs a narrow strip of Jurassic rock, separating them from the alluvial flats in which marling and warping are still practised.

RUSTON (A. G.). **The Economics of Sugar Beet Growing—Place in the Rotation.** *Brit. Sugar Beet Grower*, vol. 2, No. 10, p. 267.

An examination of the records of the crops under observation during the last five years makes it quite clear that the acreage costs, tonnage, and net surplus or deficit are affected to a very great extent by the influence of the crop which precedes it. Thus in 1925 the crops following roots or potatoes left an average net profit of £8 5s. 3d. an acre, those following the cereal crops one of £6 10s., while similar results have been obtained in the case of the 1926, 1927 and 1928 crops.

RUSTON (A. G.). **The Economic Value of Poultry on the Farm.** *The Estate Magazine*, vol. xxix, No. 6.

The economic importance of poultry on the farm, though not yet realised to the full, is year by year becoming more apparent to the farming community, and one is now beginning to find an ever-increasing number of holdings which are specialising to a greater or less degree of intensity in that direction.

The returns from the dairy herd are determined more by marketing facilities than any other factor. The returns from pigs are unstable, the returns from sheep sure but not high; these may be looked upon as gilt-edged securities in the farming world; the returns from poultry have been sure, reliable, steady and well maintained at a comparatively high level, free from the general wide fluctuations of the pork trade or the local price variations so characteristic of the milk industry.

RUSTON (A. G.). **An Interesting Co-operative Egg Collecting Station.** *Scott. Journ. Agric.*, vol. xii, No. 2, p. 139.

The Stamford and District Co-operative Egg and Poultry Society, Limited, though fairly small, has had a quite successful history, and has undoubtedly played a useful and valuable part in helping to develop the poultry industry in the district.

During the twelve years of its existence, after paying its members for their eggs prices above rather than below those prevailing in the district, it has set aside £1,124 to meet the depreciation of its plant, and after making allowances for this, has shown a total trading profit of £2,371, of which £940 has been kept in the business as reserve, £243 has been utilised in paying interest on subscribed capital, and £1,188 has been distributed as bonus to members and staff.

RUSTON (A. G.). **Survey of Farming Systems in Yorkshire.** *The Yorkshire Post Agric. Supp.*, July 1929, p. 22.

While everyone has realised the importance of the county from an industrial point of view, few have appreciated the part it plays in agriculture, still the foremost industry in the county. Yorkshire, however, comprises about one-ninth of the total agricultural land of England, and for many centuries has been the centre of some of the best and most enlightened farming in the British Isles. The proportionate production in Yorkshire compared with the total for the country is given for various crops and animal produce.

MANCHESTER UNIVERSITY.

ORR (J.). **The Science of Investment in Farming.** *Berkshire F.Y.B.*, 1929.

Investment in farming can be reduced to a science, and is reduced to a science by many farmers who watch carefully the results of experiments in management made by themselves and others. Their steady and increasing success seems to be due to instinct, but what is called instinct here is the quick and accurate interpretation of experience. It is a quality and habit which is improved by practice until it can be depended on to give certain and invariable results. By research and experiment men discover profitable lines of development in the management of their land, of crops and of livestock. They make themselves so proficient in handling their capital in these lines that a return is assured.

MIDLAND AGRICULTURAL AND DAIRY COLLEGE.

JONES (A.). **Live Stock Insurance.** *Scott. Journ. Agric.*, vol. xi, No. 4.

This was the last of three articles appearing in the above journal on the problem of livestock insurance. Mention is made of the absence of statistical evidence of livestock losses in this country, which makes it difficult to assess the risks the farmer undertakes. Statistical information collected from some 200 farmers by the writer is then given. The summarised tables show the percentage mortality in each class of livestock. The article concluded with reference to the difficulties Joint Stock Companies have to overcome in undertaking livestock risks and also suggested that some form of mutual insurance would perhaps be more successful.

SEALE HAYNE AGRICULTURAL COLLEGE, NEWTON ABBOT, DEVON.

CURRIE (J. R.) and LONG (W. H.). **An Agricultural Survey in South Devon.** *Seale Hayne Agric. Coll.*, Aug., 1929.

A survey embracing 205 farms in 16 contiguous parishes in South Devon for the year Lady-day 1927 to Lady-day 1928. The study discusses the development of survey work, and the accuracy of the method. Comparisons are made of the agriculture of England and Wales and of Devon, and of the changes in agriculture from 1881–1927. The farms are sorted into groups to compare type of farming, size of business, and efficiency factors, and, further, the influence of crop yields, rent per acre, soils, incomes of owners and tenants, and the value of the farmers' labour.

SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE.

WYLLIE (J.). **Some Problems in Farm Management.** *Trans. High and Agric. Soc.*, 1929, pp. 21–46.

In this article, the writer emphasises the need for the right point of view in approaching farm management problems and suggests that there is room for greater emphasis upon the marketing side, as opposed to the producing side, of the farm business. He also stresses the fact that in the long run the benefits from agricultural research accrue mainly to the general public rather than to the farming community.

WYLLIE (J.). **Investigation into Farming Costs of Production and Financial Results. Report No. 7—Milk Production: Five Years' Costs and Financial Results.** pp. 160–210, *S.E.A.C.*

The over-all result for the five years ended Michaelmas, 1928, from 20 farms, covering 70 farming years, was a total *loss* of £4,235, before reckoning interest charges or managerial salaries, on a production of 1,415,189 gallons of milk, equivalent to an average loss of 38s. per cow per annum, or 0·7d. per gallon on an average yield of 647 gallons per cow per annum. This general result is in marked contrast to that obtained from five of the 20 farms which have been included in the investigation for the five-year period. On these 5 farms, 530,294 gallons of milk were produced at a total *profit* of £4,645, equivalent to 112s. per cow per annum, or 2·1d. per gallon on an average yield of 642 gallons per cow per annum.

Even these five farms, however, showed remarkable variations, the profits per gallon varying from 1·0d. to 3·3d., the profit per cow per annum from

£2 16s. 0d. to £8 8s. 0d., and the profit on the capital invested from 5·4 to 14·0 per cent. per annum.

The report deals at length with the causes of these variations and one of the most interesting points brought out is the reduction in the cost of labour and of foodstuffs per gallon over the five year period, in spite of the slightly higher rate of wages and the slightly higher price level of foodstuffs.

WYLLIE (J.). **Some Checks in Farm Management.** *Essex County F.U.Y.B.*, 1929, pp. 194–200.

This is a plea for more accurate record-keeping on the farm, especially as regards labour and feeding-stuffs. It is maintained that even on presumably well-managed farms leakages are quite usual, chiefly because the farmer is unaware that they are going on. Concrete evidence on this point has been obtained in the course of the investigation referred to in the report mentioned immediately above.

WYLLIE (J.) and KNOX (M. A.). **Another Clay Farming Episode.** *Jour. S.E.A.C.*, 1929, pp. 75–86.

A description of the financial experience of a post-war farmer on about 120 acres of Weald clay for the five years ended Michaelmas, 1928. The general result was that the farmer received, on the average, 5 per cent. per annum on his farming capital, 33s. per week for the work he did in the cowsheds and fields, but no salary as manager of the business. A full analysis of the financial results is given, on the basis of complete cost accounts.

EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.

WHITTAKER (E.). **Population and Rewards in Agriculture.** *Scott. Journ. Agric.*, vol. xii, No. 2, pp. 190–195.

Reasoning from (*a*) progress in agricultural methods and materials, and (*b*) vital statistics, this article concludes that there is a continual tendency for workers to move from agriculture into other industries. Barriers impede this movement, with the result that the supply of agricultural workers tends to be excessive, and their rewards lower than obtain in urban industry.

The arguments and conclusion are supported by statistics.

(R) PRESERVATION AND TRANSPORT.

LONG ASHTON FRUIT RESEARCH STATION, BRISTOL.

Garner, O. . **Cider Making Trials for the Season 1927–28.** *Ann. Rep. Agric. and Hort. Res. Sta., Long Ashton*, 1928; also in *Journ. Bath and West Soc.*, Series 6, vol. III, 1928–29.

The single variety trials were again carried out as a competition amongst growers. There were 180 entries in 6 classes: four classes for single variety apples, one class for a definite mixture of named varieties of apples and one class for single variety pears.

Several of the varieties of apples were tested for the first time and some of them produced ciders of high quality. In the perry class the first prize was won by a variety of pears which was tested for the first time.

FRUIT AND VEGETABLE PRESERVATION RESEARCH STATION, BRISTOL UNIVERSITY.

Hirst, F. . **Modern Fruit Canning Operations.** *Journ. Min. Agric.*, Apr., 1929, Vol. 36, No. 1.

This article gives an account of the necessary operations in fruit canning, and comprises preparation of the fruit, grading, syrup, exhaust, sealing, sterilizing and cooling. The various machines used in modern fruit canning factories are described, and the times for processing English fruits in the different sizes of cans are given.

Hirst, F. . **The Canning of Peas.** *Food Manufacture*, Dec., 1928, Vol. 3, No. 8.

Peas at present are only canned in three or four centres in England, but in these centres there appears to be no difficulty in getting farmers to grow peas for the canneries. As this is one of the most popular of our vegetables, and as it grows remarkably well in this country, there appear to be marked possibilities for the grower and the canner. The results of a number of tests on different varieties of peas are given, and the various operations necessary for the production of the canned product are described.

Hirst, F. . **Modern Processing Methods in Fruit Canning.** *Food Manufacture*, June, 1929, vol. 4, No. 6.

This paper embodies an address given at the Canners' Convention at Cambridge on June 28th. It deals with the scientific principles underlying the methods used in the exhaust process, and in the sterilizing of canned fruit.

RESEARCH INSTITUTE IN PLANT PHYSIOLOGY, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY.

Emmett, A. M. . **An Investigation of the Changes which take place in the Chemical Composition of Pears stored at Different Temperatures, with special reference to Pectic Changes.** *Ann. Bot.*, xliii, 289–348, 1929.

The pectin changes in Conference pears were followed during ripening, and it is shown that the development of soluble pectin is the chief factor concerned in the softening of fruit. Differences in keeping quality appear to be due mainly to differences in the breakdown of the pectic compounds. There is evidence for the presence in the juice of a considerable amount of some unidentified substances of non-reducing and non-acidic character which may be sorbitol.

HAYNES (D.) and ARCHBOLD (H. K.). **A Quantitative Study of Chemical Changes in Stored Apples.** *Ann. Bot.*, xlii, 965–1,018, 1928.

An elaborate study of the carbohydrate and acid changes of apples in storage. Methods of analysis are discussed and also the question of the best method of stating the results which are referred to original fresh weight. The relation of the sugar losses to one another and to the acid loss and also to the nitrogen content are considered.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

BRYAN (J. M.). **American Research Work on Canning and Points of Practical Interest to Canners.** *Sheet Metal Industries*, 1929, 3, 331.

A summary of recent progress in canning research in America with particular reference to heat penetration and the discoloration of canned products.

BRYAN (J. M.). **Note on the Sulphide Stain Method for Determining Small Quantities of "Volatile Sulphur" in Sugar.** *Analyst*, 1928, 53, 589.

A modification of J. S. Mann's "Sulphide Stain" method was found to be very sensitive.

CALLOW (E. H.). **The Determination of Chlorine in Animal Tissues.** *Biochem. Journ.*, 1929, 23, 648.

A method is described for the complete extraction of chlorine from animal tissues by means of boiling water. The chlorine in the extract is estimated by boiling with excess $AgNO_3$ and concentrated HNO_3 and carrying out a Volhard titration on the filtrate.

A criticism is given of Christy and Robson's method for estimating chlorines in biological fluids. It is shown that the estimation of $AgNO_3$ by titration with KI in the presence of KIO_3hIO_3 and KNO_3 using starch as an indicator cannot be quantitative because starch and iodine only give a blue colour in the presence of soluble iodides.

The Low Temperature Research Station at Cambridge. *Sheet Metal Industries*, 1929, 3, 143.

Description of fittings and outline of objects and results already obtained in the canning section of this station. From account furnished by Sir W. B. Hardy, and experts at the research station.

KIDD (F.) and WEST (C.). **Retardation of the Ripening of Pears by the Exclusion of Oxygen.** *Nature*, 1929, 123, 315.

A brief account of experimental work on this subject.

KIDD (F.). **Biology and Refrigeration.** *Cantor Lectures. Journ. Roy. Soc. Arts*, 1929, 77, 269, 288 and 313.

The first lecture deals with the way plants react to low temperatures in nature, the second with the refrigeration of fruit and the third with problems of meat storage.

MORRIS (T. N.). **Corrosion of the Tinplate Container.** *Sheet Metal Industries*, 1929, 3, 265.

Experiments on the action of accelerators such as sulphides and sulphites and inhibitors such as gelatin and other colloids on the corrosion of iron were described.

Inhibitors were found in refined beet sugar (untreated) and in cane sugar inverted by heat and citric acid.

The greatest de-tinning of tin-plate occurred both in the presence and absence of air at from pH4 to pH5 in citric acid solutions buffered with sodium

citrate. This is significant in view of the fact that fruits of low acidity often give more trouble than the more acid ones.

MORAN (T.). **Recent Advances in the Low Temperature Preservation of Foodstuffs.** *Journ. Soc. Chem. Ind.*, 1929, 48, 245T.

A review of recent work on the precise significance of temperature in the preservation of foodstuffs.

MORAN (T.) and SMITH (E. C.). **Post-mortem Changes in Animal Tissues — The Conditioning or Ripening of Beef.** *D.S.I.R. London, Food Investig. Sp. Rep.*, No. 36, 1929.

Experiments are described which show that the palatability of beef is improved in storage at temperatures above the freezing point. The improvement is most marked in respect of tenderness and is greatest with the so-called coarse joints. The chemical, physical and bacteriological changes taking place in the meat post-mortem have been analysed and a scheme is put forward taking these changes into consideration, to provide for the routine hanging of beef in public abattoirs.

An appendix to the report describes experiments on the palatability of frozen beef.

MORAN (T.). **Critical Temperature of Freezing—Living Muscle.** *Proc. Roy. Soc.*, 1929B, 105, 177.

The critical temperature of freezing of living amphibian muscle is approximately –2°C. corresponding to the removal of 78 per cent. of the total water in the muscle. If this temperature or degree of desiccation is exceeded the muscle immediately dies. Muscles can be supercooled below –2°C. without damage.

SMITH (E. C.). **The Formation of Lactic Acid in the Muscles in the Frozen State.** *Proc. Roy. Soc.*, 1929B, 105, 198.

The freezing of living muscle at temperatures in the neighbourhood of the critical point (see previous abstract) causes a rapid production of lactic acid in the muscle whilst still in the frozen state. Muscles frozen at temperatures above the critical point are capable of removing this lactic acid on thawing, but in those frozen below this temperature, the mechanism of removal is destroyed.

ONSLOW (M. W.) and ROBINSON (M. E.). **Oxidising Enzymes. X. The Relationship of Oxygenase to Tyrosinase.** *Biochem. Journ.*, 1928, 22, 1,327.

The authors do not agree with Pugh and Raper that tyrosinase has all the properties ascribed by Onslow to oxygenase.

SMITH (A. J.). **Some Experiments on the Transport of Chilled Butter from Cork.** *Proc. Brit. Ass. Refrigeration*, 1929, 25 (No. 2), 55.

An account of experiments carried out in collaboration with the Empire Marketing Board and the Free State Department of Agriculture, on the carriage of chilled butter from Ireland to Great Britain in insulated railway wagons and insulated containers specially constructed for this purpose.

THOMAS (M.). **The Production of Ethyl Alcohol and Acetaldehyde by Apples in Relation to the Injuries Occurring in Storage: Part I. Injuries to Apples Occurring in the Absence of Oxygen and in Certain Mixtures of Carbon Dioxide and Oxygen.** *Ann. App. Biol.*, 1929, 16, 444.

In this paper the poisoning of Newton Wonder apples by the products of zymasis is considered in detail.

(S) ENGINEERING.

INSTITUTE OF AGRICULTURAL ENGINEERING, OXFORD.

BROWN C. A. C. **Electricity on the Farm: Its Use and Cost.** *Berkshire Farmers' Year Book.* Reading, Berks: N.F.U., 1929.

This article sets out the more essential points in the cost of using electricity. The cost of electrical working is compared with the cost of alternative supplies of power heat and light; since the comparison applies to farms the alternatives are oil for light and power and coal and coke for heat. Electricity comes out favourably for light and power but compares unfavourably with coke and coal for heat except in special circumstances.

BROWN C. A. C. **Windmills and Windpower.** *Article in Encycl. Brit., 14th edition.*

OWEN B. J. **Seed Drills.** *The Field,* March 28th, 1929.

Various types of drill are briefly referred to. The question of accuracy in the performance of drills is discussed. In cup drills irregularities may arise from improper adjustment or unskilful use; in force feed drills there may especially in the external feed type, be variable delivery as between row and row; in both types a cause of irregularity is the height at which the seed box is raised above the ground. The causes of irregular performance in drills have not been very fully studied, if these irregularities can be shown to have an appreciable effect on crop yields, investigation might be profitably undertaken.

OWEN B. J. **Agricultural Engineering.** *Agricultural Research in* 1927. London: R.A.S.E., 1928.

This chapter contributed to the third annual volume of the Royal Agricultural Society's resumés of agricultural research, covers the same ground as before. American and continental work on tractors is summarized, and French work on the use of producer gas for tractors is referred to. Among other matters drills, transplanting machines, potato and sugar-beet harvesting implements and the standardisation of agricultural machinery are dealt with. As regards standardisation, this appears to be most advanced in Germany and Russia. There is also a short note on the scientific organisation of agricultural labour.

OWEN B. J. **Power: The Standby of the Future.** *Farmer and Stockbreeder,* May 6, 1929.

It is pointed out that early pioneers of tractors had some prejudice to work against; the spread of the motor-car has resulted in increased general familiarity with the internal-combustion engine, while engineers have not been slow to introduce improvements in tractors. A plea is made for a small-powered machine of light weight able to do the work of the ordinary two-horse team. The use of electricity is also discussed. The farmer, if he is not to be left behind, must follow the lead of the industrialist and use power-actuated machinery as fully as his conditions allow.

OWEN B. J. **The Drying of Agricultural Products.** *Trans. Inst. Chem. Eng.,* vol. vi., 1928.

This is a paper read at a Conference of the Institution on December 7th, 1928. Methods of drying grass and cereal crops are described. For successful

drying, the pressure, volume and velocity of the air must be in a definite relationship to the mass of material. Reference is made to the feeding value of young grass and to the desirability of some economic method of preserving it in dried form. Grain drying and the drying of sugar beet are also discussed and a full description given of the latter process.

OWEN (B. J.). **The Desiccation of Vegetable Material.** *Domestic Engineering, Heat and Ventilation,* May, 1929.

This is a paper read before the Sessional Meeting of the Institution of Heating and Ventilating Engineers on March 6th, 1929. After a brief account of the more simple methods the principles of modern scientific drying are discussed, and their practical application to the drying of crops in the stack and to the desiccation of sugar beet as a preliminary to the extraction of sugar are explained. Reference is made to the drying of grain, brewers' grains, apple pomace, hops and potatoes.

OWEN (B. J.). **Agricultural Machinery and Implements** (1). **Dairy Machinery** (2). **Farm Machinery** (2). **Harvesting Machinery** (2). **Sheep Shearing Machines, etc.** (2). *Articles in Encycl. Brit., 14th edition.*

(1) *In part.*
(2) *In collaboration with H. G. Richardson.*

NEWMAN (J. E.) and BLACKABY (J. H.). **Report of Trials of the Combine Harvester-Thresher in Wiltshire, 1928.** *Bull. No 3, Inst. Agric. Eng.,* Clarendon Press, Oxford, 1929.

Describes trials with a machine, imported from Canada, cutting a width of eight feet. The machine cut and threshed 34 acres of wheat and 55 of barley at a total cost, including drying and overhead charges of rather under 22s. per acre. A description is given of the grain dryer which was used to dry the grain. An appendix discusses the moisture content of the wheat and barley during the period of harvesting and the influence of the weather thereon. References are made to American and European experiences. It is concluded that the combine harvester-thresher can be used in this country.

A Report on the Development and Costs of the Oxford Process for the Production of Sugar from Sugar Beet. *Bull. No. 4, Inst. Agric. Eng.,* Clarendon Press, Oxford, 1929.

This report is a continuation of previous reports. It was originally intended to issue a report on the first season's work under commercial conditions (1927–28), but as a sufficient amount of beet from which to draw definite conclusions had not been treated, publication was postponed until the campaign of 1928–29. An account is given of the work of that campaign, during which data of considerable value were collected. The report is divided into two parts, technical and economic. The former describes the process of drying the beet and the method of extracting the sugar from the dried cossettes. The economic section discusses the costs of the process. An appendix shows these costs in detail.

BROWN (C. A. C.). **Electricity in Agriculture. I.—Report of an Investigation. II.—General Considerations.** *Bull. No. 5, Inst. Agric. Eng.,* Clarendon Press, Oxford, 1929.

The report describes tests and observations carried out over a year on seven farms near Chester. Figures are given showing seasonal variations

in consumption of electricity and the aggregate consumption for a year for power, light and heat for both farm and domestic purposes. The power required to drive the different machines and the amount of produce treated in relation to consumption of electricity are also given. The report, on the basis of the figures obtained, draws attention to the, at present, preponderating importance of the domestic load. A second part of the report is occupied by a general consideration of the factors governing the supply of electricity to rural districts and its cost to the consumer.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN.

HAINES W. B. and KEEN B. A. **Studies in Soil Cultivation. IV—A new Form of Traction Dynamometer.** *Journ. Agric. Sci.*, 1928, vol. xviii, part iv.

A new dynamometer embodying the principle of the Collins Recorder in which the trace is impressed in the form of a groove on a celluloid ribbon, and is thus unaffected by dirt, grease, or water. The instrument consists of three parts: the hydraulic link placed in the hitch, the recording mechanism strapped to any convenient point, and the control box carried by the operator. The weight of each part is only a few pounds, and by a simple adjustment is adaptable for all ranges of work from the heaviest to the lightest draughts. The optical properties of the trace on the celluloid ribbon enable magnified copies of the record to be obtained in the laboratory.

(T) STATISTICAL AND EXPERIMENTAL TECHNIQUE.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

BALMUKAND (BHAI). **Studies in Crop Variation. V.—The Relation between Yield and Soil Nutrients.** *Journ. Agric. Sci.*, 1928, vol. xviii, pp. 602–627.

It is shown (*a*) that it is possible to fit Maskell's Resistance formula (in which the reciprocal of the yield is expressed as the sum of terms each dependent on a specific manurial factor) to experimental data involving the simultaneous variation of two numerical factors by a sufficiently rapid process of approximation, (*b*) that in every case discussed the formula fits the facts within the limits of experimental error estimated from the experiments themselves although formulae of other types fail strikingly to do so, (*c*) that the parameters appropriate to each nutrient are therefore independent of other conditions and are capable of direct physical interpretation. The interpretation suggested supplies a direct measure of the quantity of each soil nutrient actually available to the plant, and of its specific importance in determining yield.

CLAPHAM (A. R.). **The Estimation of Yield in Cereal Crops by Sampling Methods.** *Journ. Agric. Sci.*, 1929. Vol. xix, part 2.

Cereal plots were sampled by three different methods: two systematic, at least in part; and one involving a purely random location of units. The results were subjected to statistical analysis, and the disadvantages of the systematic methods were clearly demonstrated. These disadvantages were further emphasised in an analysis of earlier data on sampling methods, when it became evident that a direct estimate of sampling error is greatly superior to an indirect estimate. It is important, therefore, when carrying out investigations on the precision of such methods, and on possible ways of increasing the precision, to ensure that a direct estimate shall be obtainable.

By the use of a random sampling method, the variance due to sampling errors may be made a satisfactorily small fraction of the total variance of cereal plots about $\frac{1}{40}$th of an acre in area.

EDEN (T.) and FISHER (R. A.). **Studies in Crop Variation. VI.—Experiments on the Response of the Potato to Potash and Nitrogen.** *Journ. Agric. Sci.*, 1929, vol. xix, pp. 201–213.

While rather precise comparisons were obtained on the qualitative question by means of Latin squares in 1925–26, the reality of the depression ascribable to Chloride could not be demonstrated in these years, but became clearly apparent when, in the following year, the qualitative experiment was merged with the quantitative one.

In the earlier quantitative experiments, although satisfactory responses were obtained, the precision of the results left much to be desired, since only four replicates could be used. When by merging the experiments this was increased to nine replicates, much smaller responses were clearly measurable.

The large and complex type of experiment finally adopted thus supplied more precise information on both heads than could previously be obtained, and in addition to a more thorough exploration of the different combinations possible.

FISHER (R. A.). **Tests of Significance in Harmonic Analysis.** *Proc. Roy. Soc.*, (A), 1929, vol. 125, pp. 54–59.

Considerable discrepancy exists among meteorologists and others as to the test of significance to be applied to real or imaginary periods apparent in the data. Schuster's test is correct for testing the significance of a Fourier sub-multiple chosen in advance, if the variance of the individual values is known *a priori*. Walker's test is appropriate to the largest amplitude among the Fourier sub-multiple periods. In practice the variance must be estimated from the observations, and formulæ are given for both cases in which exact allowance is made for the sampling errors of the estimate.

FISHER (R. A.). **The General Sampling Distribution of the Multiple Correlation Coefficient.** *Proc. Roy. Soc.*, (A), 1928, vol. 121, pp. 654–673.

The exact sampling distribution of the multiple correlation coefficient is shown to be expressible in terms of hypergeometric functions. In certain classes of cases this is rational, algebraic or reducible to circular functions. The limiting case for large samples leads to a second new distribution related to a double Poisson summation of which the 5 per cent. points are tabulated. An expression is given for the probability integral, and the application of the distributions found to different classes of problem is discussed.

FISHER (R. A.) and HOBLYN (T. N.). **Maximum and Minimum Correlation Tables in Comparative Climatology.** *Geografiska Annaler*, 1928, vol. iii, pp. 267–281.

In connection with a previous paper on maximum and minimum temperature variations at Rothamsted, the opportunity was taken to prepare and publish for the purposes of comparative climatology two-way tables of these variates for each month of the year for the first 49 years of experience at Rothamsted. The tables are supplemented by analyses of variance in which the year to year variation is distinguished from the day to day variation within the same year.

FISHER (R. A.). **On a Distribution yielding the Error Functions of several well-known Statistics.** *Proc, Intern. Math. Cong.*, Toronto, 1924, pp. 805–813.

The χ^2 distribution found by Pearson in 1900, and the t-distribution of "Student" provide exact solutions of many sampling problems other than those studied by these authors; in addition a third distribution which may be regarded as a generalisation of these two supplies the solution for intra-class correlations, the goodness of fit of regression formulæ, the comparison of variances and the significance of multiple correlation and correlation ratios.

IRWIN (J. O.). **Note on the χ^2 Test for Goodness of Fit.** *Journ. Roy. Stat. Soc.*, 1929, vol. xcii, pp. 264–266.

A critical note on two different methods of applying the χ^2 test of goodness of fit. In the first no allowance is made for the reduction of the number of degrees of freedom when estimates of the population parameters are made from the sample. In the second the allowance is made. The author points out the differences between the hypotheses on which the two methods are based and gives his reasons for preferring the second method.

IRWIN (J. O.). **On the Frequency Distribution of any number of Deviates from the Mean of a Sample from a Normal Population and the Partial Correlation between them.** *Journ. Roy. Stat. Soc.*, 1929, vol. xcii, pp. 580–584.

An extension of a result which had previously been obtained only for one or two deviates.

PAGE (A. J.). **On the Annual Revision of Forecasting Formulas based on Partial Regression Equations.** *Journ. Amer. Stat. Assoc.*, 1929, vol. xxiv, pp. 123–126.

A simple labour-saving formula is developed by means of which multiple regression equations may be modified appropriately for the inclusion of a new set of observations. The process is recommended as a routine measure for official crop forecasts and other purposes, in which it is important to keep the prediction formula employed up to date, and to make use of all available information.

WISHART (J.). **The Correlation between Product Moments of any Order in Samples from a Normal Population.** *Proc. Roy. Soc., Edin.*, 1929, vol. xlix, Pt. 1, pp. 78–90.

It is shown that by means of a new method of attack, devised by R. A. Fisher, problems on the correlation between product moments, which had hitherto been solved only to a limited extent and by approximate methods, can be worked out in their full generality. The correlation between the t th semi-invariant estimates is shown to be equal to the t th power of the correlation between the variates in the normal population considered, while that between any two estimates of the product semi-variants is also worked out.

WISHART (J.) and HINES (H. J. G.). **Fertiliser Trials on the Ordinary Farm.** *Journ. Min. Agric.*, 1929, vol. 36, No. 6, pp. 524–532.

The experience of Rothamsted Experimental Station in initiating and carrying out field experiments of the modern replicated type on ordinary farms in various parts of the country is described. Illustrations are given of a representative number of such experiments, and details are added concerning the labour necessary for the proper carrying out of the work.

WISHART (J.) and CLAPHAM (A. R.). **A Study in Sampling Technique: Effect of Artificial Fertilisers on the Yield of Potatoes.** *Journ. Agric. Sci.*, 1929, vol. xix, part 4.

RESEARCH INSTITUTE IN PLANT PHYSIOLOGY, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY.

THET SU (U.) and ASHBY (E.). **The Interaction of Factors in the Growth of Lemna, 11.** *Ann. Bot.*, xliii, 329–332, 1929.

A technique is developed for the estimation of the dry weight of Lemna. The material is dried in a vacuum desiccator over H_2SO_4, the temperature of the material being raised for 30 minutes to 50°C. by means of an electric resistance mat. In weighings a Bunge micro-balance was used.

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.

Ashby (A. W.) and Lewis (Thomas). **The Cattle Population and the Cattle Supply.** *Welsh Journ. Agric.*, vol. v, 1929.

A study of changes in the constitution of the cattle population of Wales, 1867–1927. Appendix II contains estimates of classes of cattle not recorded at some periods in the *Agricultural Statistics*. Estimated numbers of cattle sold during the period are given. Yearly sales of yearlings are variable, but small. The largest supply is of cattle over two years, but an increasing proportion is being fattened in the Principality. There has been a considerable reduction in the average age of sale and of slaughter. The dairy herd is increasing and sales of draft cows rise in proportion.

AGRICULTURAL ECONOMICS RESEARCH INSTITUTE, OXFORD UNIVERSITY.

Dixey (R. N.). **The Method of Field Experimentation.** *Journ. Min. Agric.*, vol. xxxvi, No. 4, p. 341.

This article questions the use of the plot experiment as the best means of studying farm practice with a view to its improvement. It is claimed that information collected by surveys covering wide ranges of farming experience is more effective in enabling farmers to judge between different practices, not only because such information is a better measure of the chances of obtaining a higher output, but also because the results of different practices are measured in terms of profit or loss.

(U) AGRICULTURAL METEOROLOGY.

WELSH PLANT BREEDING STATION, ABERYSTWYTH.

FAGAN (T. W.). **The Effect of Weather at Harvest Time on the Chemical Composition of Hay.** *Rep. Agric. Meteor. Conf.*, Min. Agric., 1928.

In considering the effect of weather at harvest time on the chemical composition of hay, the tendency is to think of it from one point of view alone, namely, the loss it suffers through excessive washing by exposure to rain, when its soluble constituents may to a large extent be lost. That hay harvested under extreme conditions of this nature suffers severe loss there can be no doubt, but comparable losses may result from the weather being of such a character as to cause delay in cutting or to necessitate extra turning and shaking during harvesting. The deterioration in chemical composition of both stem and leaf of a grass with age is shown, and it is to be noticed that this is not confined to the fall in protein and rise in fibre, but that with age there is a fall in phosphoric acid and lime, which is reflected in a lower percentage of silica free ash.

The leaf at all stages of growth is more nutritious than the stem, and if during the actual making of hay unfavourable weather is experienced necessitating extra turning and shaking in its drying, the loss of the more delicate portion of the grasses and clovers that almost invariably takes place under such circumstances, has a very material effect on the chemical composition of the produce.

LONG ASHTON FRUIT RESEARCH STATION.

WALLACE (T.). **Frost Injury to Apple Trees.** *Gard. Chron.*, No. 2203, vol. lxxxv, 1929, and *Fruit Grower*, Mar. 15th, 1929.

The paper records definite cases of frost injury to apple trees, which occurred in the plantations of the Research Station, Long Ashton, during the extremely cold spell which occurred during the period Feb. 10th–20th, 1929, when the temperature at ground level fell to 6° F.

The most serious injury occurred on a block of trees of the variety Lane's Prince Albert, planted as 2-year-olds in the fall of 1919 and growing in a situation exposed to the south-west under conditions of high cultivation and fairly generous (though not extremely high) manurial treatment. The injury was of the type known as Bark Splitting in which the bark of the main stem is split longitudinally and becomes detached from the wood.

An account is given of methods adopted to prevent serious damage from such injury.

PLANT BREEDING INSTITUTE, CAMBRIDGE.

TAYLOR (E. MCKENZIE). **Soil Temperature in Egypt.** *Journ. Agric. Sci.*, vol. xviii, 90, 1928.

(*a*) The soil temperatures in Egypt at a number of depths were recorded by means of continuous recording thermometers. In general, the records show that the amplitude of the temperature wave at the surface of the soil is considerably greater than the air temperature wave. There is, however, a considerable damping of the wave with depth, no daily variation in temperature being observed at a depth of 100 cm.

(*b*) No definite relation between the air and soil temperatures could be traced. The maximum air temperature was recorded in May and the maximum soil temperature in July.

(*c*) The amplitude of the temperature wave decreases with increase in depth. The decrease in amplitude of the soil temperature wave is not regular owing to variations in the physical properties of the soil layers. Between any two depths, the ratio of the amplitudes of the temperature waves is constant throughout the year. The amplitude of the soil temperature wave bears no relation to the amplitude of the air temperature wave.

(*d*) The time of maximum temperature at the soil surface is constant throughout the year at 1 p.m. The times of maximum temperature at depths below the surface lag behind the time of surface maximum, but they are constant throughout the year. When plotted against depth, the times of maximum at the various soil depths lie on a straight line.

(*e*) The time of minimum temperature of the surface soil is variable and occurs just before sunrise. At depths below the surface, the times of minimum lag behind that of the surface though the time lag in the minimum is not so great as the time lag in the maximum. When plotted against depth, the times of minimum lie on a straight line.

(*f*) Three types of alteration of the phase of the temperature wave were recorded: (i) an alteration with season, (ii) an alteration with depth, and (iii) an alteration dependent upon the direction of flow of heat in the soil below the zone of daily variation in temperature. As a result of the alteration in phase of the temperature wave, the duration of heating and cooling varies with depth. The greater the depth, the greater the period of heating and the shorter the period of cooling.

(*g*) Owing to the seasonal and depth alterations in the phase of the temperature wave, the depth of the zone of daily variation in temperature is variable.

(*h*) The presence of cloud at night was shown to result in the raising of the temperature of the soil surface due to the prevention of radiation and the conduction of heat from the hot layers of soil below the surface.

(*k*) The valuation of the summer fallow by means of the soil isotherms was discussed.

(*l*) It was shown that the soil layer in which the microorganic population is most dense, in which the germination of the seed takes place, and in which the roots of young plants are situated, is subject to both large daily and seasonal variations in temperature.

(*m*) It was shown that the supposed sudden fall in temperature of the surface of the rocks at sunset does not occur. It is indicated that rock shattering as a result of temperature changes probably takes place soon after sunrise.

RESEARCH INSTITUTE IN PLANT PHYSIOLOGY, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY.

ASHBY (E.). **The Interaction of Factors in the Growth of Lemna. III.—Interrelationship of Duration and Intensity of Light.** *Ann. Bot.*, xlii, 333–354, 1928.

The interrelationship of duration and intensity of light were studied by observing increase in plant and frond number, in area, and in dry weight. Light was supplied continuously for 12 hours a day, for 2 hours followed by 2 hours darkness and for 6 hours a day, all at 25° C.; the intensities were 1,400, 700 and 350 footcandles. Growth increases with increasing intensity up to 700 foot candles, but falls markedly at 1,400 foot candles.

BLACKMAN (V. H.). **Agricultural Meteorology in its Plant Physiological Relationships.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

Irwin (J. O.). **The Relation between Weather and Crop Yields.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

A short account of the contributions of Shaw, Hooker and Fisher to the study of the relation between weather and crop yields.

Irwin (J. O.). **Crop Forecasting and the Use of Meteorological Data in its Improvement.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

A lengthy review of the official and scientific work on this subject.

Richardson (H. L.). **Agricultural Meteorological Work on Soils and Manures.** *Conf. Empire Meteor.*, 1929. Min. Agric., London.

A short review with bibliography on the influence of climatic factors on soil conditions and fertiliser action.

Stoughton (R. H.). **A Method of Maintaining Constant Humidity in Closed Chambers.** *Journ. Sci. Inst.*, v. 11, 1928, Nov. pp. 365–566.

The apparatus consists of a tin about eight inches in height and four inches in diameter through a hole in which passes the neck of a carbon filament lamp. The bulb of this is covered with muslin kept wet by passing the end through another hole in the bottom of the tin into a vessel of distilled water. Near the top of the tin an inlet and an outlet tube allow of the passage of a stream of air through the tin. A hygrostat within the chamber, acting through a relay, controls the current to the lamp which is switched on when the humidity within the chamber falls to the required point.

EXPERIMENTAL AND RESEARCH STATION, CHESHUNT, HERTS.

Bewley (W. F.). **The Influence of Bright Sunshine upon the Tomato under Glass.** *Ann. App. Biol.*, vol. xvi, No. 2, 1929, pp. 281–287.

The tomato crop produced in glasshouses is affected by prevailing weather conditions. The yield per acre varies directly in relation to the total hours of bright sunshine during the period April 1st to September 30th. Total sunshine also affects the potash requirement of the tomato, less potash being required during bright sunny weather than under dull conditions.

PLANT PATHOLOGICAL LABORATORY, DEPARTMENT OF AGRICULTURE FOR SCOTLAND.

Foister (C. E.). **The Relation of Weather to Plant Diseases.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

This was a discussion of the main features of interest to the practical agricultural meteorologist concerning plant diseases caused by fungi. The object was to emphasise the growing need for more home and colonial research and observations on this subject. A bibliography of over 300 titles is appended as a guide to the subject.

NATIONAL INSTITUTE OF POULTRY HUSBANDRY (HARPER ADAMS AGRICULTURAL COLLEGE), NEWPORT, SALOP.

Parkhurst (Raymond T.). **Artificial Lights for Late-Hatched Leghorn Pullets.**

The late hatched (May) pullets responded to artificial illumination, especially during the winter period, and gave better production and profit over feed and lighting costs than the unlighted pullets. There was no ill-health or mortality and the body weight increased very materially during the experiment. Food consumption was materially increased by the use of lights. Due to the relatively small size of their eggs especially, the value of late-hatched pullets is considerably below earlier hatched pullets.

DEPARTMENT OF ZOOLOGY AND COMPARATIVE ANATOMY, OXFORD UNIVERSITY.

Elton (C.). **The Relation of Animal Numbers to Climate.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

This paper draws attention to the cyclical variations which occur in the numbers of many wild animals, and especially wild mammals. While disease and other biological factors play a part, the influence of climate also has a great importance. In certain cases (the lemming and the snowshoe rabbit) the cycles in animal numbers point to the existence of widespread climatic fluctuations not clearly shown by meteorological observations.

ROYAL HORTICULTURAL SOCIETY.

Tincker (M.A.H.). **The Varietal Response of the Plant to the length of Day.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

MINISTRY OF AGRICULTURE AND FISHERIES.

Taylor (H. V.). **Meteorological Research and Fruit Production.** *Conf. Empire Meteor.*, 1929, Min. Agric., London.

(V) GENERAL AND UNCLASSIFIED.

HORTICULTURAL RESEARCH STATION, CAMBRIDGE.

Woodman (R. M.) and Taylor (E. McKenzie). **The Character, Properties and Possible Uses of Bentonite, a Sodium Clay.** *Journ. Soc. Chem. Ind.*, 48, 121T–124T.

Bentonite, a colloidal clay, is found to consist mainly of sodium clay. Suspended in water it gives a solution of pH 10·5. The replaceable bases present are 69·9 mg.–equiv. of sodium and 23·9 mg.–equiv. of calcium per 100 gm. of dry material.

It is a good emulsifier for certain oils, yielding mainly the desirable oil-in-water type in the experiments quoted. With cresylic acid it yields both types.

It is a water-softener acting by base exchange, thus being useful in cases of permanent hardness.

The fault of bentonite as a practicable emulsifier and water-softener is its impermeability to water.

Woodman (R. M.) and Gallagher (P. H.). **An Attempted Measurement of the Partition Co-efficient of a Colloid, Gelatine, between Two Liquids.** *Journ. Phys. Chem.*, 1929, 33, 1097–1106.

Describes an attempt to measure the distribution of gelatine between cresylic acid and water with the object of explaining the formation of two types of emulsion in a system.

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN, HERTS.

Hind (H. Lloyd) and Day (F. E.). **The Fermentation Industries.** *Ann. Rep. Soc. Chem. Ind.*, 13, 1928, pp. 531–564.

A review, with references to the original papers and their abstracts, of progress during 1928 of research work on industrial fermentation with special discussion of yeasts, bios, the hexosephosphates, and the composition of barley and malt in relation to brewing quality.

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There seems to be no essential difference in structure and composition between gums and hemicelluloses, both consisting of hexose and pentose sugars linked to uronic acids. On the basis of sterical similarities it is suggested that it is by the protracted mild oxidation of linked hexose, and in particular, galactose units that pectin, and the hemicelluloses and gums are formed.

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A discussion from the point of view of possible value for afforestation of the principal types of waste land in North Wales. The principal types discussed are Grass Heath, Sub-alpine Grassland, Upland Peat and Lowland Peat.

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APPENDIX IV.

LIST OF ABBREVIATIONS OF TITLES OF PERIODICALS, ETC., USED IN THIS VOLUME.

Agric. Econ. Soc.	Agricultural Economics Society.
Agric. Prog.	Agricultural Progress.
Amer. Nat.	American Naturalist.
Ann. App. Biol.	Annals of Applied Botany.
Ann. Bot.	Annals of Botany.
Ann. Inst. Pasteur.	Annales de l'Institut Pasteur, Paris.
Ann. & Mag. of Nat. Hist. ...	Annals & Magazine of Natural History.
Ann. Rep. Agric. & Hort. Res. Stat.	Annual Report of the Agricultural and Horticultural Research Station, Long Ashton.
Ann. Rep. Soc. Chem. Ind. ...	Annual Report of the Society of Chemical Industry.
Biochem. Journ.	Biochemical Journal.
Brit. Assoc. Adv. Sci.	British Association for the Advancement of Science.
Brit. Journ. Exp. Biol.	British Journal of Experimental Biology.
Brit. Med. Journ.	British Medical Journal.
Bull. Ent. Res.	Bulletin of Entomological Research.
Conf. Emp. Meteor.	Conference of Empire Meteorologists.
Edin. Med. Journ.	Edinburgh Medical Journal.
E.M.B.	Empire Marketing Board.
Encycl. Brit.	Encyclopædia Britannica.
Ent. Mon. Mag.	Entomologist's Monthly Magazine.
Essex F.U. Journ.	Essex County Farmers' Union Journal.
Essex F.U. Yr. Bk.	Essex County Farmers' Union Year Book.
Eugen. Rev.	Eugenics Review.
Gard. Chron.	Gardeners' Chronicle.
Genetica.	Geneticas' Gravenhage.
Hereditas.	Hereditas, genetiskt arkiv. Lund.
Inst. Agric. Eng.	Institute of Agricultural Engineering.
Journ. Agric. Sci.	Journal of Agricultural Science.
Journ. Amer. Stat. Soc.	Journal of the American Statistical Society.
Journ. Anat.	Journal of Anatomy.
Journ. B.D.F.A.	Journal of the British Dairy Farmers' Association.
Journ. Bath & West Soc. ...	Journal of the Bath and West and Southern Counties Society.
Journ. Comp. Path. & Thera. ...	Journal of Comparative Pathology and Therapeutics.
Journ. Ecol.	Journal of Ecology.
Journ. Genet.	Journal of Genetics.
Journ. Helm.	Journal of Helminthology.
Journ. Hered.	Journal of Heredity.
Journ. Inst. Brew.	Journal of the Institute of Brewing.
Journ. Kent F.U.	Journal of the Kent Farmers' Union.
Journ. Linn. Soc.	Journal of the Linnean Society.
Journ. Min. Agric.	Journal of the Ministry of Agriculture and Fisheries.
Journ. N.I.A.B.	Journal of the National Institute Agricultural Botany.
Journ. Path. & Bact.	Journal of Pathology and Bacteriology.
Journ. Phys. Chem.	Journal of Physical Chemistry.
Journ. Physiol.	Journal of Physiology.
Journ. Pom. & Hort. Sci. ...	Journal of Pomology and Horticultural Science.
Journ. R.H.S.	Journal of the Royal Horticultural Society.
Journ. Roy. Soc. Arts	Journal of the Royal Society of Arts.
Journ. Roy. Stat. Soc.	Journal of the Royal Statistical Society.
Journ. S.E.A. Coll.	Journal of the South-Eastern Agricultural College.
Journ. Soc. Chem. Ind.	Journal of the Society of Chemical Industry.
Klin. Wschr.	Klinische Wochenschrift, Berlin.
Kolloid-Zeits.	Kolloidzeitschrift, Dresden.

Min. Agric. Econ. Ser.	Ministry of Agriculture and Fisheries, Economic Series.
Min. Agric. Misc. Pub. ...	Ministry of Agriculture and Fisheries, Miscellaneous Publications.
Min. Agric. Res. Mono. ...	Ministry of Agriculture Research Monograph.
N.F.U. Yr. Bk.	National Farmers' Union Year Book.
Nat. Vet. Med. Assoc.	National Veterinary Medical Association.
N.U.P.S. Yr. Bk.	National Utility Poultry Society Year Book.
N.Z. Journ. Sci. Tech.	New Zealand Journal of Science and Technology.
Phytopath.	Phytopathology.
Pig Breed. Ann.	Pig Breeders' Annual.
Proc. 1st Inter. Cong. Soil Sci....	Proceedings of the 1st International Congress of Soil Science.
Proc. Inter. Math. Cong. ...	Proceedings of the International Mathematical Congress.
Proc. Path. Soc.	Proceedings of the Pathological Society.
Proc. Roy. Phys. Soc.	Proceedings of the Royal Physical Society, Edinburgh.
Proc. Roy. Soc.	Proceedings of the Royal Society.
Quart. Journ. Expt. Physiol. ...	Quarterly Journal of Experimental Physiology.
Quart. Journ. Micr. Sci.	Quarterly Journal of Microscopical Science.
Quart. Rev. Biol.	Quarterly Review on Biology.
Rep. Agric. Meteor. Conf. ...	Report of the Agricultural Meteorological Conference.
Rev. App. Entom.	Review of Applied Entomology.
Rev. App. Myco.	Review of Applied Mycology.
R.A.S.E.	Royal Agricultural Society of England.
Sanit. Journ.	Sanitary Journal.
Sci. Agric.	Scientific Agriculture. Ottawa.
Sci. Prog.	Science Progress.
Scott. For. Journ.	Scottish Forestry Journal.
Scott. Journ. Agric.	Scottish Journal of Agriculture.
Soil Sci.	Soil Science.
Trans. Brit. Mycol. Soc. ...	Transactions of the British Mycological Society.
Trans. Ent. Soc. Lond.	Transactions of the Entomological Society, London.
Trans. 1st Inter. Cong. Soil Sci.	Transactions of the 1st International Congress of Soil Sciences.
Trans. High. & Agric. Soc. ...	Transactions of the Highland and Agricultural Society.
Trans. Inst. Chem. Eng. ...	Transactions of the Institute of Chemical Engineering.
Trans. 2nd Comm. Inter. Soc. Soil Sci.	Transactions of the Second Commission International Society of Soil Science.
Vet. Journ.	Veterinary Journal.
Vet. Rec.	Veterinary Record.
Welsh Journ. Agric.	Welsh Journal of Agriculture.
Welsh Plant. Breed. Stat. Bull	Welsh Plant Breeding Station Bulletin.
W. Afric. Med. Journ.	West African Medical Journal.

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